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THE IRON TRADE REVIEW

A Weekly Journal Devoted to the Machinery, Metal-Working and Foundry Trades, and Iron and Steel Manufacture.

VOLUME XXXVII — CLEVELAND, OHIO, AUGUST 4, 1904 — NUMBER 31

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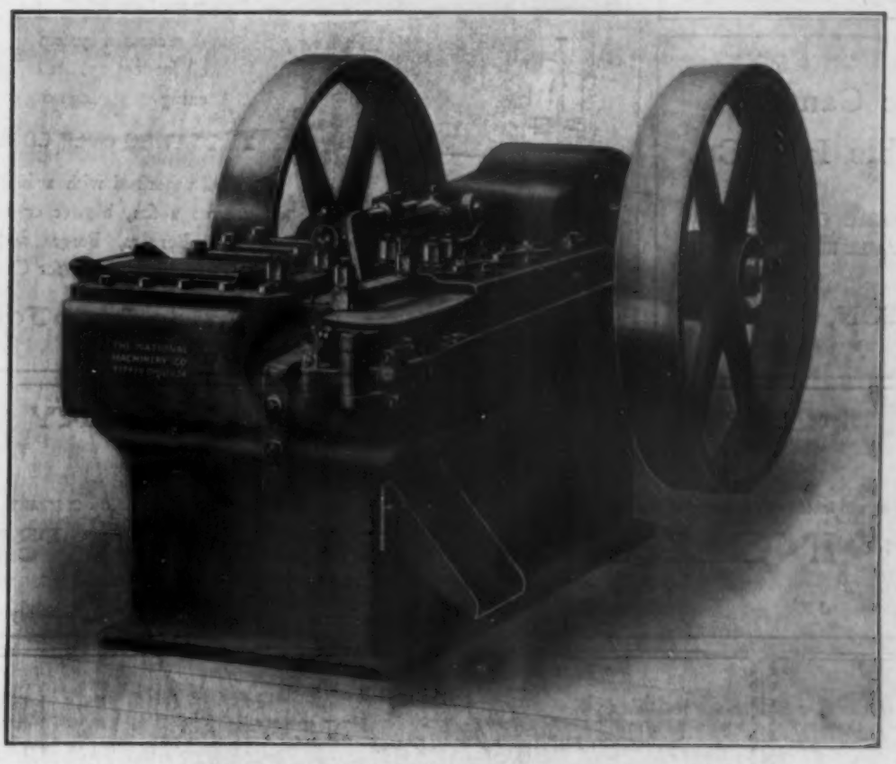

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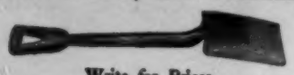

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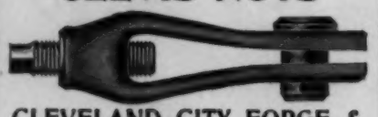

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THE IRON TRADE REVIEW

VOLUME XXXVII CLEVELAND, OHIO, AUGUST 4, 1904 NUMBER 31

THE WEEK IN IRON CIRCLES.

THE MARKET AT LARGE.

The principal developments of the past week have been in pig iron, which is more active. In Northern foundry irons this activity has been at the expense of prices in some instances, but the tone of the market is at the moment rather firmer. This is more noticeable in the Central West, where the placing of one pig iron contract on account of Pennsylvania tunnel castings and the virtual closing of another are features, added to which is an order from a minor iron and steel consolidation for the resumption of shipments, long held up, on an old contract for Bessemer iron, said to amount to 80,000 tons. Of the pig iron for tunnel castings 25,000 tons has been bought, for shipment to Wheeling, from a Shenango Valley furnace, the iron to be made in the next six months and shipped as needed. The price is reported to be close to $11.60 at furnace. The same selling interest has substantially closed a sale of 25,000 to 30,000 tons to the Buffalo concern that will undertake the second half of the O'Rourke contract for the North River tunnel castings. The second half of the East River contract (54,000 tons of which has been taken at Catasauqua, Pa.) is still unplaced. The prospect of full operation of two Valley merchant furnaces in view of the above new business and the resumption of Bessemer iron shipments as stated, has created a better feeling among sellers and in Eastern Ohio and Western Pennsylvania quotations are about 25 cents higher on Bessemer and foundry irons. For the latter $11.50 at furnace on No. 2 has disappeared, delivered prices at Pittsburg now ranging from $12.60 to $12.75. Bessemer iron for the balance of the year is now more generally quoted at $12.25 at furnace.

The buying of foundry irons in the past fortnight has shown unmistakable improvement over the two or three months preceding and indicates the using up of stocks in consumers' yards; but it does not necessarily mean any increase in consumption. Signs are yet lacking of any new start in foundry lines. In the South there has been some further curtailment in iron production; in the North a few resumptions are reported, but these promise to be offset by furnaces now planning to go out. It is evident that further improvement in the Northern pig iron market must take place if Southern furnaces are to get business in the Central West or in New England at $9.50 Birmingham for No. 2 foundry. Prices on Northern irons have varied considerably in recent buying and the weak sellers seem to be not yet altogether eliminated. At Chicago a large purchase of basic iron is reported Cincinnati notes one transaction of 10,000 tons in foundry iron.

An independent Pittsburg interest is in the market for 60,000 tons of steel, with the expectation of buying at $19, but the business is not yet placed. In general the output of steel works is unchanged, but there is sufficient steel on the market at less than pool prices to make the latter a continuing dead letter.

Rail orders are still reported in news dispatches, as though buying were on. So far as these reports can be traced they are but the revamping of orders reported earlier in the year. Railroads are not now in the market either for rails or for other material. Estimates on the next Pennsylvania order put it at half this year's, which was for 202,000 tons.

Plate prices continue to be cut and bids on structural work are plainly based on less than 1.60c at mill for shapes. That so little account is taken of these infractions of agreements indicates a general recognition of the fact that there can be no real struggle for tonnage until tonnage is in sight. The July record of the leading steel construction interest showed about 25 percent less than a normal business. At Chicago considerable construction work is in sight. In other finished material lines current business is of summer proportions. Sheets still show a ragged market. The wire and wire nail trade is between seasons and the starting up of mills for fall business is still postponed. The reduction in tin plate prices was a surprise. At $3.30 a box, with the extra 1 percent discount, the total reduction from high mark is $1.38.

PITTSBURG.

(Special Telegram.)

PITTSBURG, Aug. 3.—The Pittsburg Steel Co. has placed an order for 110,000 tons of Bessemer steel, on a conversion deal with the Republic Iron & Steel Co. Deliveries extend over the next ten months. The Pittsburg Steel Co. has purchased 50,000 tons of the Bessemer pig iron for conversion, from the Bessemer Pig Iron Association at $12 at furnace, and 35,000 tons from Valley furnace interests outside the association. The balance of the iron needed will be furnished by the Republic Iron & Steel Co. The basis of the conversion is $6, f. o. b. Youngstown, and the freight to Monessen makes the price of the steel delivered, $19.25.

OFFICE OF *The Iron Trade Review*,
429 PARK BUILDING, Aug. 3.

The Wheeling Mold & Foundry Co. placed a contract with one of the Valley furnaces late last week for 25,000 tons of Bessemer iron, with the option of taking foundry, at a price said to net the furnace about $11.60 per ton. The iron is to be used in the manufacture of castings for a part of the New York tunnel. While the delivery of the castings extends over a period of sixteen months, the pig iron will all be produced within the next six months and will be piled in the furnace yard for shipment to the foundry as required. This scheme of stocking the iron brought out the low prices named, as furnace operators were willing to accept lower prices on the contract for deliveries that could be completed in six or seven months than if extended over a period of more than a year. Shipments on one large contract for Bessemer iron to go to a leading independent steel interest have also been ordered resumed and will not terminate until July 1, 1905. This contract was placed nearly six months ago, but owing to the falling off in demand deliveries were held up. During the eleven months that one Valley furnace will operate on this order about 80,000 tons will be delivered. These two orders take one furnace out of the market practically for a year while another is sold up until well after February. The pig iron market has been greatly strengthened in consequence, advances ranging from 25 to 35 cents per ton having been made by most of the furnace operators. Sales of Bessemer iron for delivery over the last four months of the year have been made at $12.25 and $12.35, Valley furnace, while for prompt shipment, it is doubtful if $12.25 could be shaded to any extent.

Contracts for the coke to be used in the manufacture of the Bessemer iron referred to above were also closed in the week, amounting to over 100,000 tons. The coke to be used on the contract that extends up to next July was placed at a price slightly below $1.50 at the ovens, while that for the other contract was secured at a considerably lower price. Furthermore the iron for another portion of

the tunnel castings may be placed at any time, and it is probable that the same arrangement made by the Wheeling Mold & Foundry Co. will obtain in this order. It is believed that the iron will be produced in the Buffalo district.

A number of idle stacks in the Valleys have resumed operations this week. The Mabel furnace at Sharpsville, which has been making a limited output while using up accumulated flue dust, will soon make full output, while the Claire furnace is about to start. The Brier Hill stack is also preparing to resume while the Carnegie Steel Co. blew in a third idle furnace at Youngstown this week. This stack has been off since March. The National Tube Co. started one of its furnaces at McKeesport which has been out for several months undergoing repairs. There has not been much change in the operation of steel plants; the Ohio works of the Carnegie Steel Co. started up after an idleness of one week, while the open-hearth plant of th LaBelle Iron Works at Steubenville was shut down for three weeks for much needed repairs. The finishing departments of this plant are on in full, however, and the steel plant will get in operation as soon as possible as the steel is badly needed.

Inquiry for steel has improved. One local finishing mill is in the market to cover a year's requirements amounting to close to 60,000 tons. Efforts are being made to secure this material on a conversion basis, but as yet the contract has not been placed. While association prices are being maintained on the very small business that is being offered,it is certain that this large order will be placed from $3 to $4 per ton below these quotations. In finished lines no very big improvement is noticeable except in structural material, and in this instance it is nothing more than the seasonable demand. The reduction on tin plate, announced in these columns last week, came as a surprise to the trade. With an extra 1 percent in the discounts the reduction really amounts to 18.3 cents a box.

Pig Iron.—As soon as it was announced that the contract for 25,000 tons of iron for the Wheeling Mold & Foundry Co. had been placed, Valley furnace operators advanced asking prices on all grades of iron. For Bessemer iron 25 to 35 cents a ton more is asked, while $11.50 foundry iron has disappeared from the market entirely. The announcement that shipments have been resumed on a large order for Bessemer iron, closed early this year and which will not conclude until July 1, next year, caused a further stiffening and several operators refuse to consider the delivery of iron after October. We note the sale of 1,200 tons of Bessemer iron for delivery the last four months at $12.35, Valley furnace, and the sale of 4,000 tons, same delivery, at $12.25. No. 2 foundry is held by some furnaces at $12.50 Pittsburg, for early delivery, while others refuse to quote below $12.85. On forge iron nothing lower than $12 Pittsburg, can be done. Three idle stacks in the Valleys have resumed and one at McKeesport. The Hannah furnace of the Republic Iron & Steel Co. at Youngstown is also to go in at an early date. Southern iron is entirely out of this market at present prices. While $9.25 can be done on No. 2 foundry Birmingham, the majority of the furnaces are asking $9.50, which makes the Pittsburg delivered price $1 per ton above Northern iron. We revise quotations as follows:

Bessemer, Valley	$12 10 to 12 25
Bessemer, Pittsburg	12 95 to 13 10
No. 1 Foundry	13 00 to 13 25
No. 2 Foundry	12 60 to 12 85
Gray forge, Pittsburg	12 00 to 12 15
Chilled basic, Valley	11 75 to 11 95
Chilled basic, Pittsburg	12 60 to 12 75

Steel.—One of the leading independent interests is in the market for about 60,000 tons of steel for delivery during the next year. Efforts are being made to secure the material on a conversion basis, but as yet the contract has not been let. While pool quotations are being more rigidly adhered to than for some time, it is because the business offered is not sufficient to warrant concessions. It is expected that this order will be placed much below the agreed prices, and that not more than $19 per ton will be paid. The open-hearth plant of the LaBelle Iron Works, Steubenville, is off this week and will continue idle the greater part of the month. The Ohio works of the Carnegie Steel Co. have resumed, but otherwise there has been no change in steel works operations. Agreed quotations are as follows: Bessemer and open-hearth billets, 4 x 4 inches, and slabs up to and including 0.25 carbon, $23 Pittsburg, Wheeling, Valley, Johnstown, Ashland, Ky., Ironton, O., and Lorain, O., 0.26 and including 0.60 carbon, $1 advance; and 0.61 to 1.00 carbon, $2 advance. Billets smaller than 3⅞ inches and sheets and tin bars are $1 per ton extra. Bessemer and open-hearth rods are quoted at $28 to $28.50 Pittsburg.

Ferro-Manganese.—The market continues exceedingly quiet. Domestic ferro is held at $41 to $41.50, delivered at buyer's mill at any point east of the Mississippi, in carload lots.

Spelter.—Prime Western grades are held at 4.87½c, Pittsburg, in carload lots.

Muck Bar.—The muck iron market is quiet and neutral bars are held nominally at $24 Pittsburg.

Skelp.—Demand for skelp has improved to some extent, pipe mills buying for the second half of the year. Steel skelp, grooved, is selling at 1.35c Pittsburg, and sheared at 1.37½c. Grooved iron is held at 1.40c, and sheared at 1.45c to 1.47½c.

Plates.—The plate market shows no improvement and mills continue to operate at only a limited capacity. We make the following quotations: Tank plates, ¼ inch thick and up to 100 inches in width, 1.60c at mill Pittsburg; flange and boiler steel, 1.70c marine, ordinary firebox, A. B. M. A. specifications, 1.80c; still bottom steel, 1.85c; locomotive firebox, not less than 2.10c; and it ranges in price to 3c. Plates, more than 10 inches, 5c extra 100 pounds. Plates 3-16 inch in thickness, $2 extra; gauges Nos. 7 and 8, $3 extra. These quotations are based on carload lots with 5c extra a hundred pounds for less than carload lots. Terms, net cash in 30 days.

Bars.—Demand for both iron and steel bars continues light. Agricultural implement manufacturers are in no hurry to cover for future requirements and no activity in this market is looked for until the latter part of next month. We make the following quotations: Bar iron, 1.25c to 1.30c Pittsburg for local delivery, while for Western shipments quotations are based on 1.25c to 1.35c Pittsburg. Hoops are held at 1.55c base, and bands at 1.35c taking bar extras. Bessemer steel bars, 1.35c; open-hearth, 1.40c; plow beams and cultivator beams, 1.35c net; channels, angles, zees and tees, Bessemer, under 3 inches 1.45c. The following differentials are maintained on steel: Less than 2,000 pounds of a size, not less than 1,000 pounds, 10 cents advance; less than 1,000 pounds of a size, 30 cents advance.

Structural Material.—Seasonable demand for structural shapes is fair, new business being limited almost entirely to small lots. The American Bridge Co. has taken the contract for the erection of the new power plant for the Mesta Machine Co., calling for a limited tonnage. Agreed quotations are being maintained as follows: Beams and channels, 3 to 15 inches, 1.60c; 18 to 24 inches, 1.70c; tees, 1.65c; zees, 1.60c; angles, from 3 to 16 inches, 1.60c; universal mill plates, 1.60c.

Rails and Track Material.—While reports of new contracts for rails are numerous, in most instances the orders reported were placed six months ago, shipments being held up and again resumed, the latter action being the foundation for the reports of new contracts. The demand for light rails is by no means heavy and low prices continue to be named. We make the following quotations: Standard sections, 50 pounds and over, in lots of 500 tons and over, $28; car lots and less than 500 tons, $30; less than car lots, $32; light rails, 16 to 40 pounds, $20 to $21. Track material, spikes, 1.60c to 1.65c.

Sheets.—The demand for sheets has improved to some extent, but is not sufficient to warrant the quoting of any higher prices than have been ruling. Lower than 2.10c for 28-gauge black sheets has not been named by any of the mills up to date. We make the following quotations on black sheets, one pass through cold rolls: No. 8, 1.60c; No. 9, 1.65c; Nos. 12 to 14, 1.70c; Nos. 15-17, 1.75c to 1.80c; Nos. 18-21, 1.85c to 1.90c; Nos. 22-24, 1.95c; Nos. 25-26, 2c; No. 27, 2.05c; No. 28, 2.10c to 2.15c; No. 29, 2.35c to 2.40c; No. 30, 2.50c to 2.55c. Galvanized: Nos. 12-17, 2.20c to 2.25c; Nos. 18-21, 2.35c to 2.40c; Nos. 22-24, 2.50c to 2.55c; Nos. 25-26, 2.65c to 2.70c; No. 27, 2.90c; No. 28, 3.10c; No. 29, 3.45c to 3.50c; No. 30, 3.85c to 3.90c.

Tin Plate.—Demand for tin plate at present is seasonably light, and the reduction announced last week is for the

purpose of stimulating demand. We quote 100-pound boxes of coke plates at $3.30 f. o. b. nearest mill, Pittsburg district. Two percent off for cash in ten days.

Pipes and Tubes.—A meeting of the independent pipe manufacturers was held in this city yesterday. Quotations on merchant pipe are being maintained better than at any time in the past six months, and demand has also improved to some extent. Discounts to consumers, carload lots f. o. b. Pittsburg, plus freight to destination according to Tube Rate Book, are as follows:

MERCHANT PIPE.

	Steel.		Iron.	
	Black.	Galv.	Black.	Galv.
⅛, ¼ and ⅜ inch	70	55	69	54
½ inch	73	63	72	62
¾ to 3 inches	78½	68½	77½	67½
3½ to 6 inches	77	67	76	66
7 to 12 inches	72½	57	71½	56
Extra strong plain ends, ⅛ to 8 inches	69	59	68	58
Double extra strong, ½ to 8 inches	60	50	56	46

MERCHANT BOILER TUBES, LESS CARLOADS, 22 FEET AND UNDER.

	Steel.	Iron.
1 to 1½ inch	48	43
1¾ to 2¼ inches	60	43
2½ inches	63	48
2¾ to 5 inches	68	55
6 to 12 inches	60	43

Wire and Wire Nails.—The wire mills of the largest producer did not start up this week as anticipated, and no date has been named for general resumption. Concessions continue to be named on the limited tonnage that is offered. We make the following quotations: Wire nails, carload lots to jobbers f. o. b. cars Pittsburg, are quoted $1.90 base; plain wire, carload lots, $1.80 base; barb wire, carload lots, $2.20 base; staples, carload lots, $2.05 keg. Galvanized 30 cents extra. Carload lots to retailers are held at 5 cents advance in all lines, and on less than carload lots a further advance of 10 cents is charged. Steel and iron cut nails, carload lots, $1.75, and less than carload lots, $1.80 f. o. b. Pittsburg, plus freight to point of destination. Terms, 60 days, less 2 percent off in 10 days.

Merchant Steel.—At the recent meeting of the shafting manufacturers an extra discount of 5 percent was made on material for shipment to the Pacific coast. Carload lots for this delivery are held at 52 and 5 off. No change was made in the quotations applying to the other sections of the country. We quote as follows: Toe calk, 1.90c; carriage spring steel, 1.75c; tire steel, 1.55c to 1.60c; plow steel, 6 inches and under, 1.35c for Bessemer and open-hearth; plow slabs, ¾ inch and heavier, 1.60c. The demand for shafting on the part of the machinery manufacturers is not heavy, and tonnage has therefore been considerably affected. Drawn and cold rolled shafting is held at 52 percent off in carload lots and 47 off in less than carload lots.

Old Material.—Quotations on all grades of old material are higher, and as most of the available material is in the hands of the dealers at present, it is doubtful if the recent low prices will be duplicated soon. Our quotations for gross tons are as follows: Heavy melting stock, $11 to $11.25; cast iron borings, $5 to $5.50; busheling scrap, $8.75 to $9; No. 1 wrought, $11 to $11.50.

Coke.—While there are reports of higher prices on coke, actual business continues to be done at prices somewhat lower than have been prevailing. One furnace in the Youngstown district closed for its requirements of Connellsville coke for the last half at a slightly lower price than $1.35. Another contract for furnace coke for delivery to July 1 next year was placed at a little better than $1.50, a low price when deliveries are considered. Many of the operators refuse to sell their furnace coke below $1.40, while others are asking $1.45 for delivery the remainder of the year. On foundry coke $1.80 is the minimum for strictly high grade Connellsville product, and a few operators are securing $2 and over.

CHICAGO.

OFFICE OF *The Iron Trade Review*,
1164 MONADNOCK BLOCK, Aug. 2.

Little has developed in local iron and steel circles within the week under review. The most noteworthy feature of the trading of the past seven days is the brisk demand for pig iron. This has been continuous since the first of July, and the tonnage booked last month is said by several dealers to be larger than that in any month since the first of the year. Both Northern and Southern furnaces have taken advantage of the buying movement to put their product on a profitable basis, and $13.50 and $13.15, respectively, are the prices now asked by the leading producers for their No. 2 iron.

There is no appreciable change in finished material. With few exceptions sellers are doing moderate business. The sentiment is strong that trade will pick up considerably after the hot weather period has passed, and mills are resting on their oars, as it were, and awaiting developments. This is particularly true of manufacturers of sheets and wire products. Prices on both have been and are very ragged, but there is no disposition on the part of sellers to place a large tonnage on mill books at prevailing figures, the stipulation being made in nearly all cases where a cut is made that the material be shipped immediately. Plates have improved and a good tonnage has been taken by Western mills at association prices. It is reported that Eastern mills are shading agreed prices in this market. Bar iron is active, a good tonnage of small business having come to the surface since our last report. Specifications for steel bars continue plentiful, some consumers anticipating their contract quotas. Forging billets are in fair demand, and there is a disposition on the part of some producers to shade prices on large lots. Structural business is better than it has been in some weeks, though there is ample room for greater improvement. Tubular goods are quiet, with little business in sight. Coke is in fair demand, and for spot delivery premiums of 25 cents and 50 cents a ton are being paid. Transactions in scrap are few and far between, though the sentiment is much improved, a condition which some dealers have thought sufficient to warrant an increase in prices on several grades.

Pig Iron.—Some large tonnages have been booked during the week under review, one order for basic iron placed by a local mill with a Southern furnace running into five figures. Northern furnaces have taken the bulk of the business offered, the demand being largely for No. 2 foundry iron and malleable iron. The call for Southern iron has fallen off within the last week, as a result of the higher prices asked by the leading producers and the fact that most of them are refusing to sell for periods longer than three months. Southern furnaces have taken a firm stand for the maintenance of the $9.50 basis, and while some iron can be bought from isolated stacks enjoying a differential in freight rate or whose product is not up to standard, at less than this price, the general run of furnaces in the South are asking $13.15 Chicago for No. 2 foundry. Northern irons are strong and stocks in furnace yards are being reduced. Most of the orders placed with local stacks in the past week have called for deliveries extending through the balance of the year, and there has been some disposition to buy for requirements further ahead. One local furnace is asking 25 cents a ton higher than the present schedule for iron to be delivered in the last quarter of 1904, and $14 a ton for iron to be shipped in the first three months of 1905. Our quotations are without change, as follows:

Lake Superior Charcoal	$14 50 to 14 75
Northern Coke Foundry No. 1	13 75 to 14 00
Northern Coke Foundry No. 2	13 25 to 13 50
Northern Coke Foundry No. 3	12 75 to 13 00
Northern Scotch Foundry	14 50 to 15 00
Ohio Strong Softeners No. 1	14 50 to 15 00
Ohio Strong Softeners No. 2	14 00 to 14 50
Southern Coke Foundry No. 1	13 40 to 13 65
Southern Coke Foundry No. 2	12 90 to 13 15
Southern Coke Foundry No. 3	12 65 to 12 90
Southern Coke Foundry No. 4	12 40 to 12 65
Southern No. 1 Soft	13 40 to 13 65
Southern No. 2 Soft	12 90 to 13 15
Southern Gray Forge	12 15 to 12 40
Southern Mottled	12 15 to 12 40
Southern Silveries (4% to 6% Silicon)	14 85 to 15 85
Jackson Co. Silveries (8% to 10% Silicon)	17 80 to 18 30
Alabama and Georgia Car Wheel	18 85 to 19 35
Malleable Bessemer	13 50 to 14 00
Alabama Basic	13 15 to 13 40

Billets.—Forging billets in carload lots have been in fair demand, for which association prices are said to be obtained. It is not doubted in this market that a good sized order would bring better prices than those agreed upon. Regular quotations for Bessemer and open hearth billets, 4 x 4 and larger up to .25 carbon, are $24; up to and including .60 carbon, $1 extra; over .60 carbon, $2

extra. Billets 3⅞ in. and smaller, and sheet and tin bars, $25. Open hearth billets from store, $1.30 per 100 lb.

Iron and Steel Bars.—Bar iron seems to grow in strength from week to week, and for small lots some mills are now asking 1.40c Chicago. A good increase in the week's business is noted, though the orders have been largely for small lots and scattered over a wide area. Specifications for steel bars are sent in promptly and are for full contract requirements, indicating that consumption of this product is without diminution. We quote Chicago delivery: Mill shipments, bar iron, 1.35c to 1.40c; soft steel bars, 1.51½c; soft steel angles, less than 3 x 3, 1.61½c; hard steel angles, 1.30c; hoops, 1.71½c. On lots from store we quote as follows: Bar iron, 1.75c base full extras; steel bars, 1.70c to 1.80c base, half extras; hoops, 2c to 2.10c rates, full extras.

Sheets.—There is little change to be noted in prices and demand. A number of mills have withdrawn from the market rather than continue to take business at the present profitless figures, and sellers look for some improvement in the situation as a consequence. There is a disposition on the part of those still doing business to insist on prompt shipment of material on orders taken at the low prices current. We continue to quote for one pass, cold rolled, blue annealed sheets, mill shipments, Chicago delivery, as follows: Nos. 9 and 10, 1.77½c to 1.79½c; Nos. 11 and 12, 1.79½c to 1.86½c; Nos. 13 and 14, 1.86½c to 1.91½c; Nos. 15 and 16, 1.89½c to 2.01½c. On box annealed, one pass, cold rolled: Nos. 18 and 20, 2.01c to 2.06½c; Nos. 22 and 24, 2.06½c to 2.11½c; Nos. 25 and 26, 2.11½c to 2.16½c; No. 27, 2.16½c to 2.21½c; No. 28, 2.26½c to 2.31½c; No. 29, 2.41½c to 2.46½c; No. 30, 2.51½ to 2.56½c. Jobbers report a fair demand for both black and galvanized sheets from stock. Prices are without change, and we quote as follows: No. 10 and heavier, 2c to 2.10c; No. 12, 2.05c to 2.15c; No. 14, 2.10c to 2.20c; No. 16, 2.20c to 2.30c; No. 18, 2.30c to 2.40c; No. 20, 2.30c to 2.40c; No. 22, 2.35c to 2.45c; No. 24, 2.40c to 2.50c; No. 26, 2.50c to 2.60c; No. 27, 2.60c to 2.70c; No. 28, 2.70c to 2.80c; No. 29, 2.85c to 2.95c. Galvanized sheets are quiet, and we quote Pittsburg discounts, f. o. b. mill, 80 and 5 to 80 and 10. For shipments from local store, 75, 10 and 5 to 80 percent.

Structural Material.—Some increase in business is noted for the smaller sizes of shapes, though nothing very large has been taken during the week. Building is active in this city and vicinity and a large amount of structural material is being figured on by fabricators all the time. Prices are without change, and we quote carload lots, Chicago delivery, mill shipments, as follows: Beams and channels, 16 inches and under, 1.76½c; 18 inches and over, 1.86½; universal plates, 1.76½c; angles, 3 x 3 and larger, 1.81½c; zees, 1.76½c. On lots from store, we quote beams, channels and angles, 3 x 3 and larger, 2c; beams, 18, 20 and 24-inch 10c extra; tees, 2.05c rates.

Plates.—There is nothing to report except the routine of daily orders which keep up to past proportions. It is reported, though without verification, that the association prices are being shaded in this market by mills in the agreement, this cutting being exclusive of that on plates 60 inches wide and narrower, which for some months have been openly cut $2 a ton. However, we continue to quote "official" prices on carload lots, mill shipments, Chicago delivery, as follows: Tank steel, ¼ inch and heavier, 1.76½c; flange steel, 1.86¼co; marine, 1.90½c; universal mill plate, 1.76½c to 1.81½c: 3-16-inch, 1.86½c; Nos. 7 and 8, 1.19½c; No. 9, 2.10½c; No. 10, 1.91½c; No. 11, 1.96½c; No. 12, 2.01½c. From store, we quote tank steel, ¼-inch and heavier, 2c; 3-16, 2.10c; No. 80, 2.15c; No. 10, 2.15c; flange steel, 2.25c, all f. o. b. warehouse.

Rails and Track Supplies.—Demand for these products has been light during the week. Competition grows keener in light rails, and further low prices have been made. We quote, heavy sections, mill shipments, as follows: 500 tons and over, $28; less than 500 tons to carload lots, $30; less than carload lots, $32; second quality rails, $27; light rails $22 to $24; track supplies, f. o. b. Joliet mill, angle bars, 1.35c; spikes, first quality, 1.65c to 1.75c; track bolts, 3½ x ¾, with square nuts, 2.20c to 2.30c per 100 lb.; with hexagon nuts, 2.35c to 2.45c.

Merchant Pipe.—New business is not of proportions to excite comment, though specifications on contracts are coming in freely. The midsummer months are usually dull, and the present listless condition of the market is not an unusual experience at this time of the year. We quote carload lots, mill shipments, random lengths, f. o. b. Chicago, as follows:

MERCHANT PIPE.

	Steel Pipe.		Guaranteed Wrought Iron Pipe.	
	Black. Percent.	Galv. Percent.	Black. Percent.	Galv. Percent.
⅛ to ¾ inch	68.35	53.35	67.35	52.35
½ inch	71.35	61.35	70.35	60.35
¾ to 3 inches	76.85	66.85	75.85	65.85
3½ to 6 inches	75.35	65.35	74.35	64.35
7 to 12 inches	70.85	55.35	69.85	54.35

Boiler Tubes.—Demand from boiler makers continues good, which is about all that can be said in regard to this product. Prices are without change, and we quote carload lots, mill shipments, Chicago delivery, as follows:

BOILER TUBES.

	L. W. Steel. Percent.	C. C. Iron. Percent.	Seamless Steel. Percent.
1 to 1½ inch	46.35	41.35	52.35
1¾ to 2¼ inch	58.35	41.35	40.35
2½ inch	60.35	46.35	43.35
2¾ inch to 5 inch	66.35	53.35	Up to 4 inches.
6 to 13 inch	58.35	41.35	50.85

The following are the agreed discounts from store, Chicago:

	Steel.	Iron.	Seamless Steel.
1 to 1½ inches	42½	37½	40
1¾ to 2½ inches	52½	35	37½
2½ inches	55	37½	40
2¾ to 5 inches	62½	47½	47½
6 inches and larger	52½	35	..

Merchant Steel.—A number of firms have yet to cover for their yearly requirements, and these contracts are expected to be placed within a short time now. Specifications are coming in freely and mills are full of business. Prices are without change, and we quote carload lots, mill shipments, Chicago delivery, as follows: Spring steel, 1.90c; sleigh shoe, flat sizes, 1.56½c; concave and convex, 1.76½c; cutter shoe, 2.25c; smooth finished machinery steel, 1.76½c base; smooth finished tire, 1.71½c; plow steel, 2.20c and upward, according to quality; toe calk, 2.06½c base. Ordinary grades of crucible tool steel, 6½c to 8c; special tool steel, 12c up. Cold rolled shafting, 52 percent from list in carload lots, and 47 percent discount in less than carload lots.

Cast Iron Pipe.—The aggregate week's tonnage is fairly large, but is marked by no unusually large contracts. Prices are firm and we quote 4-inch water pipe, $25.50; 6-inch to 12-inch, $24.50; larger sizes $24; gas pipe, $1 a ton higher.

Wire Products.—A good business has been done in the past week, though it is made up largely of specifications against old contracts. Prices are in a varied condition, some products being cut as much as $4 a ton. All producers are said to be shading prices, the average being about $2 a ton below the last schedule though some firms anxious for business have gone below this figure. With these reservations, we continue to quote the old schedule to jobbers, despite the fact that no producer is living up to it. It is given only for comparison: Wire nails, carload lots, $2.10; less than carload lots, $2.15; cut nails, carload lots, 1.80c to 1.85c; less than carload lots, 1.96½c; smooth wire, carloads, $2, and $2.05 for less than carload lots; galvanized smooth wire $2.30 in carloads and $2.35 in lesser amounts; painted barb wire, $2.40 carloads, and $2.45 in less than carload lots; galvanized barb wire, $2.70 carloads, and $2.75 less than carload lots. Staples, polished, carloads, $2.25; less than carload lots, $2.30; galvanized, $2.55 carloads and $2.60 less than carload lots. Bale ties, 82½ and 5 percent discount f. o. b. Waukegan, Ill., on straight carload lots. Poultry netting, 85 and 5 percent discount from list f. o. b. Joliet or DeKalb, with actual freight allowed not exceeding 50 cents per 100 pounds.

Foundry Coke.—There is a scarcity of coke on track

in this market, and sellers than can give spot delivery are getting premiums of 25 cents and 50 cents a ton. On contract coke $2 a ton at the ovens is asked by both Connellsville and Southern makers.

Old Material.—Several lines have advanced from 25 cents to 50 cents a ton as a result of the improved sentiment regarding the future demand for scrap iron that is prevailing. Transactions have been limited to small tonnages in the week under review, few melters being in the market for material at the present time. Country dealers and railroads are withholding their stocks from the market in the hope of later getting higher prices, which is largely responsible for the advances noted above. We have revised our quotations, and quote dealers' selling prices, gross tons, as folows:

Old iron rails	$15 00 to 16 00
Old steel rails (4 feet and over)	11 00 to 11 50
Old steel rails (less than 4 feet)	10 00 to 10 50
Relaying rails, subject to inspection	22 50 to 23 00
Relaying rails for sidetracks	18 00 to 20 00
Old wheels	11 00 to 11 50
Heavy melting steel	9 50 to 10 00
Mixed country steel	7 00 to 7 50

The following quotations are for net tons:

Low phosphorus scrap (.04 and under)	$12 00 to 13 00
No. 1 R. R. wrought	11 00 to 11 50
No. 2 R. R. wrought	9 50 to 10 00
Shafting	12 50 to 13 00
Dealers' Forge, No. 1	8 00 to 8 50
Wrought pipe and flues	7 50 to 8 00
No. 1 cast, 150 lb. and less	9 25 to 10 00
Heavy cast	7 75 to 8 25
No. 1 mill	6 00 to 6 50
Country sheet	5 00 to 5 50
No. 1 boilers, cut	7 50 to 8 00
Boiler punchings	9 00 to 9 50
Iron car axles	15 00 to 16 00
Steel car axles	13 50 to 14 00
Iron axle turnings	7 00 to 7 50
Steel axle turnings	7 00 to 7 50
Cast borings	3 50 to 4 00
Mixed borings, etc.	3 50 to 4 00
Wrought turnings	6 50 to 7 00
Machine shop turnings	6 50 to 7 00
Railroad malleable	8 25 to 8 75
Agricultural malleable	7 75 to 8 00
Stove plate and light cast scrap	7 50 to 8 00
Old iron splice bars	13 00 to 13 50

The Illinois Steel Co. started up its idle converting works, billet mill and one rod mill at Joliet, Ill., Monday, Aug. 1, and is now running full in all departments at this plant.

CLEVELAND.

OFFICE OF *The Iron Trade Review*,
1064 ROSE BUILDING, Aug. 3.

Iron Ore.—Reports of ore shipments are not at hand from all northern lake ports for July, but, judging from the shipments from Duluth, the total will exceed that of July, 1903. The shipments from Duluth were 2,527,817 tons against 2,478,430 tons in July of last year.

Considerably more inquiry for ore has developed within a few days and sales have been more numerous. One firm sold 25,000 tons to one buyer and smaller amounts to others. The tendency is for furnaces to place small orders compared with those of last year. Although inquiry had been confined almost entirely to non-Bessemers until a few days ago, buyers of Bessemer ores are now manifesting more interest in the market. Prices for Bessemer are from $3 to $3.25 for old range and $2.80 to $3 for Mesabi, and for non-Bessemer quotations range from $2.50 to $2.70 for old range and $2.25 to $2.40 for Mesabi. Freight rates remain steady at 70 cents from Duluth, 60 from Marquette and 50 from Escanaba.

Pig Iron.—The market shows considerable improvement as to inquiries and sales. Buyers are asking for quotations for the remainder of the year and in some cases for the first quarter of 1905, but sellers are not disposed to quote for delivery after Jan. 1. The usual quotation in the Valley is now $12 for No. 2 foundry but little is sold at that price, as some interests are glad to sell at $11.75. Cleveland furnaces are selling at $12.25 to $12.50 for local buyers. The principal Southern producer has instructed its agents not to sell more than 100 tons to any customer. The strike of coal miners in the South is assisting in the maintenance of prices, which are firm on a basis of $9.25 to $9.50 for No. 2 Birmingham. We quote as follows for Cleveland delivery:

Bessemer	$12 60 to 12 75
No. 1 Strong Foundry	12 75 to 13 00
No. 2 Strong Foundry	12 60 to 12 85
No. 3 Foundry	12 25 to 12 50
No. 2 Southern	13 10 to 13 35
Gray Forge	12 15 to 12 25
Gray Forge, Southern	12 00 to 12 15
Lake Superior charcoal	14 25 to 14 75

Finished Material.—The improvement in sales of ore and pig iron has not yet extended to finished material, in which inquiries do not develop in orders. Rolling mills are resuming. The Union Rolling Mill Co., Cleveland, started this week and the Empire will be in operation Aug. 8. The outlook for bar iron is not, however, encouraging. While some of the principal producers are trying to keep up the quotation 1.30c Pittsburg, 1.25c at the mill, Youngstown or Cleveland, has been done on orders of fair size and Indiana mills are selling as low as 1.20c at their plants. There is a fair demand for steel bars at 1.44½c Cleveland, for Bessemer and 1.49½c for open hearth. Some very low prices have been heard of in competition in sheets. The prices of the principal producers through jobbers are as follows: Cleveland delivery, the freight from Pittsburg being 9½ cents: Mill sales of black sheets in carload lots, No. 10, 1.74½c; No. 11-12, 1.79½c; No. 14, 1.84½c; No. 16, 1.94½c; No. 27, 2.19½c; No. 28, 2.29½c. Galvanized, mill sales, No. 14, 2.29½c; No. 16, 2.39½c; No. 18-20, 2.54½c; No. 22-24, 2.69½c; No. 25-26, 2.89½c; No. 27, 3.09½c; No. 28, 3.29½c. Black sheets out of stock: ¼ in., 1.90c; 3-16 in., 2c. Blue annealed: No. 10, 2.05c; No. 12, 2.10c; No. 14, 2.15c; No. 16, 2.25c. One pass cold rolled: Nos. 18-20, 2.35c; No. 22-24, 2.40c; No. 26, 2.45c; No. 27, 2.50c; No. 28, 2.60c; No. 30, 3c. Galvanized out of stock: ¼ in., 1.90c; 3-16 in., 2c. Blue annealed: No. 10, stock: No. 16, 2.60c; No. 18-20, 2.70c; No. 22-24, 2.85c; No. 26, 3.05c; No. 27, 3.25c; No. 28, 3.45c; No. 30, 4.25c.

Old Material.—Mills and scrap dealers are having some difficulty in agreeing on prices and few sales are being made, although there are indications of an ending of the period of extreme dullness, which has so long prevailed. We quote as follows, gross tons:

Old iron rails	$14 50 to 15 00
Old steel rails (over 6 feet)	12 00 to 13 00
Old steel rails (under 6 feet)	11 00 to 12 00
Old car wheels	10 00 to 11 00
Steel boiler plate	9 00 to 10 00
Malleable iron (railroad)	9 50 to 10 00
Malleable iron (agricultural)	8 00 to 9 00
Heavy steel	9 50 to 10 50

We quote as follows, net tons:

No. 1 R. R. wrought	$10 00 to 11 00
No. 1 busheling	9 00 to 9 50
No. 1 machine cast	9 50 to 10 50
Iron axles	15 00 to 16 00
Axle turnings	7 00 to 8 00
Wrought turnings (free from cast)	6 00 to 6 50
Grate bars	7 00 to 8 00
Pipes and flues	8 00 to 8 50
Tank iron	7 50 to 8 50
Hoop and band iron	5 00 to 5 50
Sheet iron	4 00 to 5 00
Wrought drillings	6 00 to 6 50
Stove plate	7 50 to 8 00
Steel axles	13 00 to 14 00
Cast borings	3 50 to 4 00

CINCINNATI.

August 4.

The coke market shows some slight improvement and there are more orders for foundry coke being placed than in the past several weeks. Prices remain unchanged and have a wide range. Connellsville coke is quoted at a range of $1.80 up to $2.10 per ton f. o. b. ovens.

Pig Iron.—Another week of fair buying is to be noted and the tonnage booked is probably up to the previous week in the aggregate, although the sales were mainly small, ranging from a car load up to 500 tons with but few exceptions. One large consumer took about 10,000 tons, part of which was Northern, but the bulk of the orders were for Southern irons. It is reported that the large order for Wheeling, W. Va., for Pennsylvania Railroad tunnel castings, was placed during the week and went to Northern furnace interests. The Mansfield, O., inquiry for 1,200 tons of Northern and 1,000 tons of Southern iron is still pending. A sale of 5,000 tons of Bessemer iron is reported. As to prices it may be said that while $9.25 Birmingham can still be done and is quoted, it is becoming less general and $9.50 Birmingham is heard more fre-

quently. One large Southern furnace interest is reported to have withdrawn from the market entirely. It is well established that strictly Birmingham irons are not now obtainable at under $9.50 basis, and the lower quotations come from Tennessee furnaces that have freight rate advantages. There is becoming less of this iron available. Mill irons are again in rather better demand than foundry grades and are firm, with gray forge selling at $8.25 Birmingham. Northern iron is still regarded as easy, with the open quotation for No. 2 foundry at $11.75 to $12 while in cases where strong competition prevails $11.50 has been done. The general tone of the situation is regarded as slightly stronger, which, however, may be better expressed by saying that if any change is to be noted it is in the direction of improvement in the iron market. We quote in carload lots f. o. b. Cincinnati:

Southern Foundry No. 1	$12 50 to 12 75
Southern Foundry No. 2	12 00 to 12 25
Southern Foundry No. 3	11 50 to 12 00
Southern Foundry No. 4	11 00 to 11 25
Southern Foundry No. 1 soft	12 50 to 12 75
Southern Foundry No. 2 soft	12 00 to 12 25
Gray Forge	11 00 to 11 25
Northern Foundry No. 1	12 50 to 13 65
Northern Foundry No. 2	12 65 to 13 15
Southern car wheel iron	16 25 to 16 50

Finished Material.—There has been no change in the situation so far as prices are concerned and the volume of business remains about the same as last week which means that the improvement there noted has been maintained. Bar iron is still quoted at 1.40c and is regarded as steady at that quotation. Steel bars are quoted at 1.48c, half extras, with dealers quoting 1.75c to 1.90c for iron and steel out of store. Galvanized sheets are being quoted at 75 and 10 to 75, 5 and 2½ percent off. We quote black sheets, No. 27, at 2.30c in car lots of 500 bundles. Black sheets out of store are selling as follows: No. 28, 2.70c; No. 27, 2.60c; No. 16, 2.35c; No. 14, 2.25c; No. 12, 2.16c; No. 10, 2.05c. Tank plates are dull and sell out of store at 2c for ¼-inch and 2.10c for 3-16-inch. Beams and channels are quoted at 2c from stock and angles at 1.90c to 2c for base sizes.

In merchant pipe independent mills are still underselling the schedule of the leading interest, but there are indications that these mills are getting filled up on orders and that the largest producer is getting an increasing share of the tonnage accordingly. We quote merchant pipe in carload lots as follows:

MERCHANT PIPE.
(Basing Discounts.)

	Steel Pipe. Black. Percent.	Steel Pipe. Galv. Percent.	Guaranteed Wrought Iron Pipe. Black. Percent.	Guaranteed Wrought Iron Pipe. Galv. Percent.
⅛, ¼, ⅜ inch	68.7	53.7	67.7	52.7
½ inch	71.7	61.7	70.7	60.7
¾ to 3 inch, inclusive	77.2	67.2	76.2	66.2
3½ to 6 inch, inclusive	75.7	65.7	74.7	64.7
7 to 12 inch, inclusive	71.2	55.7	70.2	54.7

BOILER TUBES.

	Steel Percent.	Iron Percent.
1 to 1½ inch	41.2	37.7
1¾ to 2¼ inch	54.2	36.7
2½ inch	56.7	41.7
2¾ to 5 inch	63.2	49.2
6 to 13 inch	54.2	36.7

Old Material.—The market shows no quotable change and the demand is still light. Dealers report the market as continuing dull with very little inquiry. We quote:

Old No. 1 railroad wrought, net tons	$10 00 to 10 50
Cast machine and foundry, net tons	9 50 to 10 00
Old iron rails, gross tons	12 50 to 13 00
Old steel rails, gross tons	9 50 to 10 00
Old short lengths, gross tons	10 00 to 10 50
Old iron axles, net tons	13 50 to 14 00
Stove plate, net tons	6 00 to 6 50
Wrought turnings, net tons	6 00 to 6 50
Cast borings, net tons	3 00 to 3 50

NEW YORK.

OFFICE OF *The Iron Trade Review*,
ROOM 1315, No. 150 NASSAU ST., Aug. 2.

Pig Iron.—There was practically no change in the local market in the past week. Northern furnaces were again in evidence, taking business at the expense of prices. Southern sales agents claim that they cannot compete with Northern furnaces at many centers, particularly in New England, Northern ores being sold in that territory at least 25 cents lower than Southern brands. Southern makers as a general rule are still holding Southern No. 2 foundry at $9.50 Birmingham, but since this price became a fixture, their sales have fallen off. So far as can be learned there is no No. 2 foundry selling at $9.25 in this vicinity, but reports that other markets have reached that figure are going the rounds. Sales of Northern and Southern irons during the past week were fairly large, with small lots the feature. This is said to be due to consumers' stocks having become depleted, and to their purchasing such iron as is necessary to meet their immediate needs. So far as large inquiries go, the market is barren just now. The opinion here is that no change in prices will take place during the present month, and whether any will occur in September will depend entirely on the condition of general business in the iron and steel industry at that time. Coincident with a movement in Tennessee Coal, Iron & Railroad Co. stock came a report that the company was about to advance its pig iron prices, but as little business is done at $9.50 a higher price is not to be expected at present. The Pennsylvania tunnel casting orders are still unsettled, according to the contractors. New York pig iron quotations at tidewater follow: Northern No. 1 X, $14.50 to $15; No. 2 X, $14 to $14.50; No. 2 plain, $13.50 to $14; Southern No. 1 foundry, $13.50 to $13.75; No. 2 foundry, $13 to $13.25; No. 3 foundry, $12.50 to $12.75; No. 4 foundry, $12 to $12.25.

Rails.—Wall Street reports that the Harriman interests have just closed contracts for 60,000 tons are untrue. These contracts were placed several months ago, and are now being revamped for stock jobbing purposes.

Finished Iron and Steel.—Business in structural shapes during the past week was noticeable for the small orders booked. There are several good propositions likely to be heard from in the near future, among them 20,000 tons for an elevated railroad extension in Chicago. Independent companies are quoting some very low figures on structural business now being figured on. The July trade of the leading interest was about 25 percent less than what it considers an average month, which is about 25,000 tons. Sheets are quite vulnerable, and jobbers' prices show wide variation, with business exceptionally dull. There is nothing of any consequence doing in bars, trade in which is only fairly active. The feeling in plates is a little better, with an expectation of increased activity. New York prices are as follows: Beams and channels, 15-inch and under, 1.75c to 1.90c; angles, 3 to 6 inches, 1.75c to 1.90c; zees, 1.75c to 1.90c; bulb angles, 2.05c to 2.35c; deck beams, 2.05c to 2.35c; sheared steel plates, tank, 1.74½c to 1.80c; flange, 1.84½c to 1.90c; firebox, ordinary, 1.94½c to 2c; refined iron and soft steel bars, 1.49½c; sheets, in carload lots New York, No. 28, black, 2.30c to 2.35c; galvanized, 3.30c to 3.35c.

Old Material.—Light business was the rule during the past week. There is no disposition to trade, only absolutely necessary material being taken. Prices are maintained, with an upward tendency manifesting itself. Holders of rails are waiting for higher prices. Heavy steel scrap is a strong feature, with asking prices higher. Other branches of the old material market are without particular feature. Prices per gross tons, f. o. b. cars, follow:

Old iron rails	$14 00 to 14 50
Old steel rails, long lengths	11 75 to 12 50
Old steel rails, short pieces	11 00 to 11 50
Relaying rails	19 00 to 20 00
Old car wheels	11 50 to 12 50
Old iron car axles	15 50 to 16 00
Old steel car axles	14 00 to 14 50
Heavy melting steel scrap	10 50 to 11 00
No. 1 railroad wrought scrap	11 50 to 12 00
Iron track scrap	10 50 to 11 00
Wrought pipe	7 75 to 8 25
Ordinary light iron	4 50 to 5 25
Cast borings	3 50 to 4 00
Wrought turnings	5 50 to 6 00
No. 1 machinery cast	9 00 to 10 00
Stove plate	7 50 to 8 25

PHILADELPHIA.

August 2.

The feeling among both buyers and sellers is that conditions will improve, but there has not yet been much change. Critics who charged the leading trade journals with being pessimistic now see that the facts were reported correctly. There is still much uncertainty as to demand and such strength as the market possesses may be attributed largely to the cur-

tailment of output. Developments during the past few days have offered some encouragement.

Pig Iron.—Sales have been more numerous and, although prices are still low, it seems probable that the bottom has been touched. Another week or two of strong buying would strengthen the market greatly. For No. 2 X foundry, $14.50 is a fair average. We quote as follows for Philadelphia and near by delivery: No. 1 X foundry, $14.75 to $15.25; No. 2 X foundry, $14.25 to $14.50; No. 2 plain foundry, $13.50 to $13.75; standard gray forge, $13 to $13.25; ordinary gray forge, $12.50 to $12.75; basic, $13 to $13.15.

Finished Material.—Large orders are scarce, but small orders are rather numerous. There has been little change, but indications favor improvement. We quote: Beams, channels and angles, 1.73½c to 1.85c, according to the specifications, and small angles, 1.50c to 1.55c. Bars, both iron and steel, 1.48½c to 1.55c; skelp, 1.45c to 1.50c, sellers' mill for grooved and a tenth more for sheared.

Old Material.—There is a little improvement. Prices are steady and in some cases better rates are obtainable. We quote: No. 1 steel scrap, $11.50 to $12; low phosphorus scrap, $16 to $16.50; old steel axles, $14.50 to $15; old iron axles, $17.50 to $18; old iron rails, $13.75 to $14.50; old car wheels, $10.50 to $11; choice railroad No. 1 wrought, $13 to $13.50; machinery cast, $11.50 to $12.25; No. 2 light scrap (forge), $9 to $9.50; No. 2 light scrap (ordinary), $7.50 to $7.75; axle turnings, $9 to $9.50; wrought turnings, $8 to $8.50; cast borings, $6 to $6.50; stove plate, $8.50 to $9.25; wrought iron pipe, $9.50 to $10.

BIRMINGHAM, ALA.

BIRMINGHAM, Ala., Aug. 1.—There has been further curtailment in the pig iron production in Alabama, the Republic Iron & Steel Co. blowing out one furnace at Thomas, leaving one in blast. The Tennessee Coal, Iron & Railroad Co. has blown out its last furnace at Bessemer but put on one of its Ensley furnaces, making five in all at Ensley now in operation. It is reported that the company is thinking of blowing in its Oxmoor furnace again. The Alabama Consolidated Coal & Iron Co. has banked its three furnaces. The Tutwiler Coal, Iron & Railroad Co. had its furnace banked last week but it is in operation again.

There has been considerable selling of iron hereabouts in the past three weeks and the Sloss-Sheffield Steel & Iron Co. has practically been out of the market for the past few days. There is no inclination to sell iron in this district under $9.50 per ton for No. 2 foundry. That price now appears to be the common quotation. Shipments of iron from the Birmingham district are picking up and railroad officials comment thereon. More than one of the companies in this district sold more iron in July than was produced. The following quotations are given: No. 1 foundry, $10; No. 2 foundry, $9.50; No. 3 foundry, $9; No. 4 foundry, $8.50; gray forge, $8; No. 1 soft, $10; No. 2 soft, $9.50. Several sales of lots aggregating over 500 tons each were made last week, orders for 2,000 and 3,000 tons respectively being reported also.

The Tennessee Coal, Iron & Railroad Co is manufacturing chiefly basic iron at its Ensley furnaces to be used in the steel plant near by. There is a good demand for steel and steel rails and this plant is in active operation. The Alabama Steel & Wire Co. is working its rod, wire and nail mills steadily also and getting its supply of steel from its steel plant at Gadsden. Two more open-hearth furnaces will be completed at this plant in the next four or five weeks.

The plate and bar mill departments in the rolling mills at Bessemer (Tennessee Coal, Iron & Railroad Co.), are working with non-union labor, but the output is not very great. No other rolling mills in the district are in operation.

There is no settlement of the miners' strike in sight, but intimation is given that during this week the operators will make an effort to start the mines with non-union labor.

The Paddock-Hawley Iron Co., St. Louis, manufacturer of iron, steel, carriage and heavy hardware, has increased its capital stock from $350,000 to $600,000. Of the increased capital $200,000 is preferred stock and $50,000 common. The business of this company was established thirty-five years ago.

The Metal Market.

NEW YORK.

OFFICE OF *The Iron Trade Review*,
ROOM 1315, NO. 150 NASSAU ST., Aug. 2.

Pig Tin.—Speculative interests were the leading factors in the market during the past week, and succeeded in advancing prices about ¼c over our last quotations. Trade conditions continue quiet. In London the market was active and strong, and prices have advanced nearly £2 since our last report. The monthly statistics, compiled by Secretary C. Mayer of the local Metal Exchange, show the total visible supply on Aug. 1 to be 13,818 against 13,780 tons on July 1, and 16,507 tons this time a year ago. Deliveries last month were 2,600 tons, arrivals 2,113 tons, with 3,209 tons afloat. Closing prices today follow: Spot and August, 27c to 27.25c. London's closings today follow: £123 5s for spot, and £123 10s for futures.

Copper.—There was no change in prices or in the condition of general business during the past week. Exports continue to be the leading feature of the market. Statistics show that the total exports for July amounted to 16,687 tons. The London market during the week was active, with only a slight change in prices. Today's closings follow: Lake, 12⅝c to 12⅞c; electrolytic, 12⅝c to 12¾c; casting, 12⅜c to 12½c. London's closings today are £57 for both spot and futures.

Lead.—Is quiet and unchanged at 4.20c to 4.25c for spot. St. Louis is firm at 4.02½c, and London remains at £11 13s 9d.

Spelter.—Trading continues light, with prices unchanged at 4.85c to 4.95c for spot. St. Louis is still quoted at 4.75c. London declined to £22 2s 6d.

Antimony.—Cookson's is 7.25c asked. Hallett's is 7.00c to 7.25c. Other brands are quoted at 6.00c to 6.25c.

Quicksilver.—We quote $42.50 per flask of 76½ pounds in lots of 100 flasks. London is £7 17s 6d.

Nickel.—Sales are made at 40c to 47c for large lots down to a ton, and at 50c to 60c for smaller quantities.

CHICAGO.

OFFICE OF *The Iron Trade Review*,
1164 MONADNOCK BLOCK, Aug. 2.

The metal market is in good condition, a fair demand existing for all materials. Prices are strong and without material change. Lake copper is quoted at 13c for carloads and 13¼c for smaller lots; casting, 12¾c for carloads and 13c for less than carload lots. Pig tin is firm at 28½c to 29c, according to quantity. Spelter, 5c to 5¼c in carload lots. Sheet zinc is without change at 6c for carloab lots of 600-lb. casks, and 6.25c to 6.35c for less than carload lots. Pig lead is still weak, being nominally quoted at 4.10c for 50-ton lots, 4.15c for carload lots, and 4.25c for lesser quantities.

Old metals are in better demand and prices are firm. We quote as follows: Copper wire and heavy, 10¼c; copper bottoms, 9¼c; copper clips, 10c; red brass, 9¼c; red brass borings, 7⅞c; yellow brass, heavy, 7c; yellow brass borings, 6c; light brass, 5c; tea lead, 3¼c; zinc, 3.40.

The Ruthenberg Process at Niagara Falls.

A plant for the manufacture of steel by electricity has been established at Niagara Falls by Marcus Ruthenberg, who for some time has been engaged at Lockport, N. Y., on experiments with this process covered by patents secured by him. A building has been rented from the Niagara Falls Power Co. and machinery is being installed. Twelve hundred horsepower of electricity will be used to begin with, and it is expected the plant will be turning out steel by the new process within a few weeks. The inventor claims that steel can be electrically produced by his process far more cheaply than by any other method.

The Saltsburg and Hyde Park, Pa., plants of the American Sheet and Tin Plate Co. resumed operations this week after an extended idleness. The Leechburg, Pa., plant was closed last Saturday for an indefinite period.

Cleveland Machinery Market.

OFFICE OF *The Iron Trade Review*,
1064 ROSE BUILDING, August 3.

Report from Cleveland manufactories concerning July business are somewhat conflicting. Some state, but not for publication with their names, that business is very flat; others make more favorable reports and, on the whole, the feeling seems to be better.

The Electric Controller & Supply Co. is having remarkable success with its new improved drive for planers. It has recently fitted a 96 x 96 x 20-foot Niles planer in the Wellman-Seaver-Morgan shops with this drive and this company is getting very good results from it. The Controller company is also getting very good results from the 36 x 36 x 12-foot Pond planer in its exhibit at the World's Fair. This method of drive is attracting the attention of all tool builders, especially the planer people, as this system enables them to adjust instantly the cutting speeds of the planer to suit the material to be cut. Machinery men will appreciate the importance of the arrangement, as it not only increases the output of the planer 30 to 40 percent, but brings the tool more nearly up to the same level as that occupied by other machine tools.

The Avery Stamping Co. finds a little better feeling in the market, but no decided change.

The Acme Machinery Co. states that if there are any changes in its business since the last report, they are for the better; that is to say, that the indications for good business are more favorable and more in evidence. The favorable outlook covers both foreign and domestic trade.

The Standard Welding Co. reports that it is happy in the amount of business that is coming to it. There is not a wonderful improvement over the past sixty days, but business is more than fair and on a very conservative basis, which would indicate a satisfactory condition.

The C. O. Bartlett & Snow Co. reports that it is getting very busy. It has received quite a nice order from Cameron & Barkley, Charleston, S. C., to be used in government work; one from the National Brick Co., Omaha, Neb.; from the Sherwin-Williams Co. for conveying and elevating machinery; also from the Semisteel Co. of this city. From every indication it seems as though this company would have a busy year from now on. Inquiries are quite plenty and there is every reason to believe that business in its line will improve very rapidly.

Steel Corporation Order Book Statements.

Perhaps an undue significance has been attached to the statements published from time to time indicating the tonnage of unfilled orders on the books of subsidiary companies of the United States Steel Corporation. Since there is no way of knowing over how many months specifications on many of these contracts may be spread out, the statement is no gauge of business prospects. Car works and railroads, in particular, have been slow in specifying this year, and in the next two months specifications are expected to drag even more. The figures for unfilled orders on the corporation's books, as given out at the beginning of different quarters, are as follows in net tons:

	1904	1903	1902
July 1	3,192,277	4,666,578	4,741,993
Oct. 1		3,728,742	4,843,007
Dec. 31		3,215,123	5,347,253
March 31	4,136,961	5,410,719	

Rail Mill for Dominion Iron & Steel Co.

The Wellman-Seaver-Morgan Co. has just taken the contract for building complete the new rail mill to be installed by the Dominion Iron & Steel Co., Ltd., at its works at Sydney, N. S. This contract was awarded in the face of very severe competition from some of the leading American, English and German rolling mills manufacturers. The entire plant is to be delivered ready for operation within ninety days. Within twenty-four hours after the awarding of the contract in Sydney, the Cleveland works of the Wellman-Seaver-Morgan Co. had started work on it. The general arrangement of the mill will be on similar lines to the mill designed by the Wellman-Seaver-Morgan Co. for the Ensley plant of the Tennessee Coal, Iron & Railroad Co., which is now in successful operation. There will be the latest improvements not only in rolling the rails but in handling them on the tables and manipulators. The Wellman-Seaver-Morgan Co. is also carrying on very extensive work in Nova Scotia for the Nova Scotia Steel & Coal Co., being engineers for its new steel works, and in addition is constructing an extensive ore handling plant, which is equipped with the Wellman-Seaver-Morgan Co.'s latest design of ore handling cranes, etc.

Personal.

D. H. Lentz, who for the past seven years has been general superintendent of the American McKenna Co.'s plants, and has been very successful with the McKenna rerolling process, has resigned from active business and will be succeeded by George Langford, who has been occupying the position of assistant for the past six years. Mr. Lentz will continue to make Joliet, Ill., his home. A few evenings since, the retiring superintendent was surprised at his home by a committee of local employes who, in behalf of the working force, presented him a handsome diamond ring.

Five prominent Swedes, appointed by King Oscar and the Swedish riksdag to visit America and participate in the International peace congress to be held at St. Louis, will soon arrive in this country. One of the delegates is Hugo P. P. Tamm, who is the most prominent iron manufacturer in Sweden, chairman of the riksdag committee on finance and considered the wealthiest man in that country.

Charles E. Howlett, of New York, has been appointed manager of the American Steel Casting Works, at Chester, Pa.

T. G. Bush, president, announces the appointment of O. H. Schultz as auditor of the Alabama Consolidated Coal & Iron Co., Birmingham, Ala., to succeed G. M. Bowers, resigned. H. Hammond has been appointed assistant to President Bush.

John Stephenson Jr., of Sharon, Pa., who was prominent in the Sharon Steel Co. as vice president and general manager, is reported to be interested in a company for the manufacture of ordnance, whose plant will be located at Sharon.

Mesta Machine Co. Power Plant.

The Mesta Machine Co., Pittsburg, awarded contracts this week for the erection of a new power plant at West Homestead where the company's works are located. The building will be 76 x 112 feet of steel construction and fireproof throughout. The American Bridge Co. has the steel erection. The equipment will consist of two 400-k. w. Westinghouse generators driven by Corliss engines built by the Mesta Machine Co., and three 200-k. w. Westinghouse generators driven by gas engines. The Corliss engines will be installed immediately while the gas engines will be erected in the near future. In addition a contract was let for eight 250-h. p. Cahall boilers. These will be equipped with automatic stokers and the plant will be modern throughout.

Hoop Mill Scale Still Pending.

(Special Telegram.)

PITTSBURG, Aug. 3.—The adjustment of the scale of the American Steel Hoop mills of the Carnegie Steel Co. at Youngstown, O., has been left by the association to its general conference committee. The recent conference failed in the effort to adjust matters with separate crews. Pending the adjustment the output of the mill has been reduced.

The strike at the American Iron & Steel Mfg. Co.'s plant at Lebanon, Pa., has been voted off by the men.

The fourth annual outing of the employes of F. E. Myers & Bros., Ashland, O., was held at Silver Lake July 30 and was attended by nearly 3,000 people. The members of the firm were in attendance and united with their employes in a thoroughly delightful day.

FINISHING GEAR BLANKS ON A BORING MILL.

A view of a 30-inch boring and turning mill with turret head, equipped with a full set of adjustable tools for finishing gear blanks ranging in size from 4 to 24 inches in diameter with but two settings, will prove of general interest. The various operations and tool holders for the work are designated alphabetically, and the tools are numbered according to the successive operations performed.

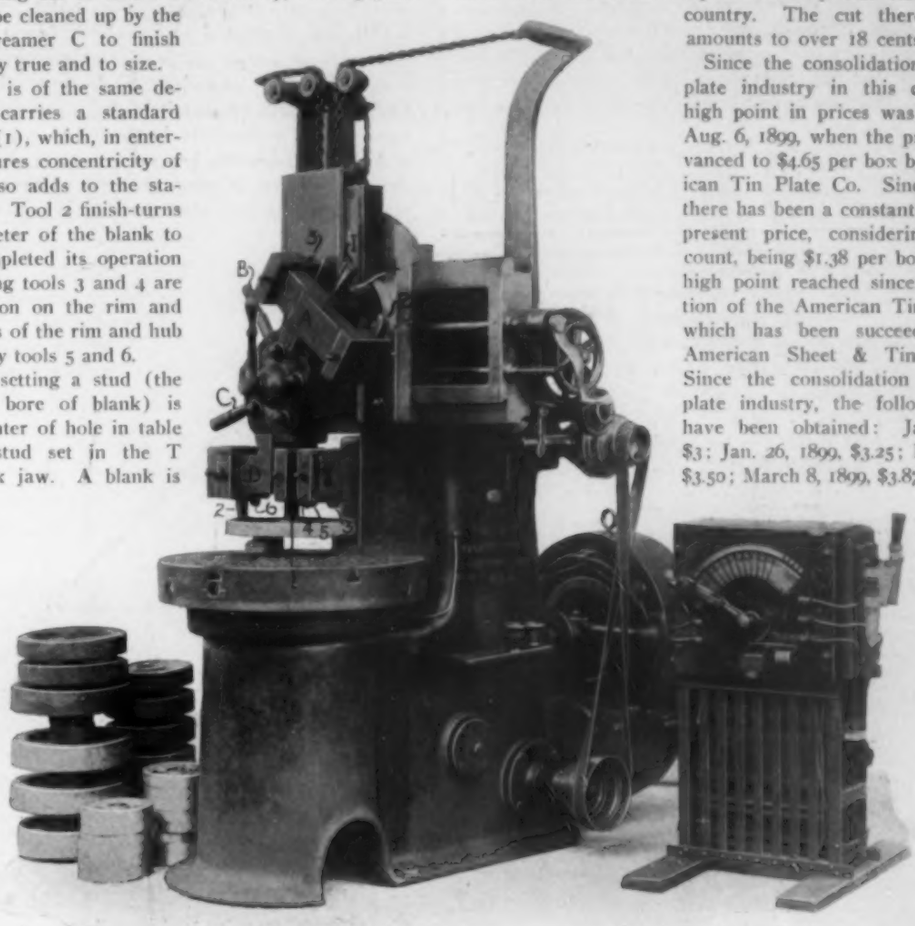
The blank is secured by finger jaws gripping inside of the rim. It is readily brought to truth by the combination chuck in the table, and is held level with the table by the parallel blocks on which it rests.

Tool holder A, carrying the four-lip core drill 1, outside turning tool 2 and facing tools 3 and 4 for the rim and hub, completely roughs one side of the blank while the hole is being rough bored.

Tool B—a single point boring tool—is next run through the bore at a racing cut to insure concentricity, leaving just enough metal to be cleaned up by the universal joint reamer C to finish the bore absolutely true and to size.

Tool holder D is of the same design as A but carries a standard sized guide plug (1), which, in entering the bore, insures concentricity of diameters and also adds to the stability of the tool. Tool 2 finish-turns the outside diameter of the blank to size and has completed its operation before finish-facing tools 3 and 4 are brought into action on the rim and hub. The corners of the rim and hub are rounded off by tools 5 and 6.

In the second setting a stud (the diameter of the bore of blank) is fitted into the center of hole in table and a driving stud set in the T slot of the chuck jaw. A blank is



METHOD OF FINISHING GEAR BLANKS ON BORING MILL.

then dropped over it and tool holder A, minus tools 1 and 2, roughs the faces of the rim and hub, which are finished by the corresponding tools in tool holder D; the rounds being formed as before.

The method of holding the blank from the inner surface of the rim insures uniform thickness of the rim when finished, and, by the use of the guide plug finishing tool D, the outside diameter is not only turned absolutely true to size but runs on centers within .0005 inch.

Twelve tools are used in the holders and all operations are completed without moving the turret slide from its central position on the rail, thereby saving all time usually required to set tools and caliper for diameters. Most of the tools employed are of the ordinary form and can be used on other boring mill work. All gears of the above sizes are finished in this way at the shops of the Bullard Machine Tool Co. of Bridgeport, Conn., and a saving of from 50 to 75 percent is made over the more common method of separate chucking and turning on arbors.

The Reduction in Tin Plate Price.

The reduction of 15 cents a box on tin plate announced by the American Sheeet & Tin Plate Co. last week was a surprise to the trade. Owing to the prices at which tin plate has been selling all year, and the refusal of the Amalgamated Association to accept a further reduction in wages, coupled with the reduction of the concessions on rebate plate, many consumers concluded that prices would advance rather than decline. The new price for 14 x 20 100-pound Bessemer cokes is $3.30 f. o. b. mill, Pittsburg district, with the regular differentials for ternes and charcoal plates. In addition to this reduction a further concession has been made in the discounts, 2 percent being allowed in the future for cash in ten days, instead of 1 percent, which has obtained in the trade ever since the tin plate industry was started in this country. The cut therefore really amounts to over 18 cents a box.

Since the consolidation of the tin plate industry in this country, the high point in prices was reached on Aug. 6, 1899, when the price was advanced to $4.65 per box by the American Tin Plate Co. Since that date there has been a constant decline, the present price, considering the discount, being $1.38 per box below the high point reached since the formation of the American Tin Plate Co., which has been succeeded by the American Sheet & Tin Plate Co. Since the consolidation of the tin plate industry, the following prices have been obtained: Jan. 6, 1899, $3; Jan. 26, 1899, $3.25; Feb. 7, 1899, $3.50; March 8, 1899, $3.87½; July 14, 1899, $4.37½; Aug. 6, 1899, $4.65; Sept. 24, 1900, $4; Nov. 3, 1902, $3.60; March 2 1903, $3.80; Nov. 16, 1903, $3.60; Jan. 25, 1904, $3.45; July 26, 1904, $3.30, when a change in discounts from 1 to 2 percent for cash in ten days was made.

The Erie Railroad has made a contract with the American Locomotive Co. to repair 600 locomotives. The contract calls for the delivery of thirty locomotives a month until the order is filled. The Erie Co. has recently reduced the number of employes in its own shops and finds it more economical to do a considerable part of its repairing by contract.

The William Tod Co., Youngstown, O., has secured a contract for a 20,000,000 gallon pumping engine from the city of Milwaukee. The contract has been pending for several months. The price is $47,000.

Steel Plant of the Grand Crossing Tack Company, at Hutchinson, Illinois.

The importance of Chicago as an iron and steel producing center has been further increased by the recent completion of the steel plant of the Grand Crossing Tack Co., at Hutchinson, a newly created suburb of South Chicago. This plant is built on the Calumet river at 118th street, where the company has 50 acres of land, situated within the territorial circle in that district in which are located so many blast furnaces and iron and steel mills. The site is especially advantageous from the standpoint of shipping facilities afforded for the conveyance of steel billets to the works at Grand Crossing, about eight miles distant. The tracks of the Pennsylvania, Michigan Central, Chicago Junction and Rock Island railroads are all within easy distance, and each railroad having the right to send its own engines on the Grand Crossing Co.'s premises, the delay usually attending the transference of freight is thereby avoided. In addition, the company will have excellent facilities for water transportation as soon as the government has completed the dredging of the Calumet river, although it does not expect to take advantage of these unless it should at some time decide that its interests would be better protected if it controlled its supply of pig iron, a probability not forgotten in drawing up the plans of the new plant. The point of the river on which the steel works are built is about five miles from the lake shore line, and steamers of heavy draught will be able to make their way up after the dredging now in progress is completed.

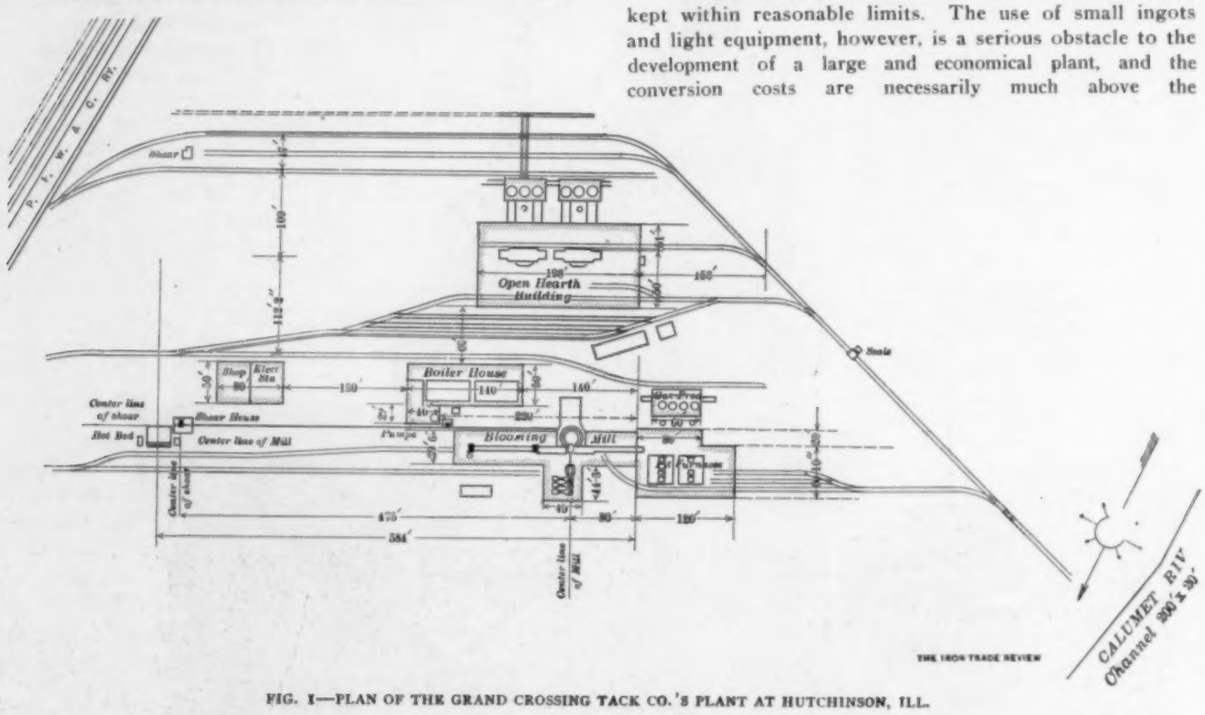


FIG. 1—PLAN OF THE GRAND CROSSING TACK CO.'S PLANT AT HUTCHINSON, ILL.

The Grand Crossing Tack Co. manufactures wire rods, wire nails, plain and galvanized wire, barbed wire, bright coppered market wire, field fencing, staples, tacks, rivets and kindred articles of which the company has a total output of 150 to 160 tons a day. The rod mill, which is of the Morgan continuous type, and the other subsidiary manufacturing departments, are located in the factory at 79th street and Stony Island avenue, a building three stories high, with a frontage of 1,068 feet, and a depth of 150 feet.

The company's position in the metal world is a distinct one. Though a steel maker, it is not a seller of steel, except in the finished form. The present capacity of the steel plant is only sufficient to supply its rod mills with 1¾-in. billets when both are working to fullest capacity. Up to the time of the completion of the Hutchinson mill the company was dependent upon its principal competitors and the outside market generally for its supply of raw material. The constant fluctuations of this market and the irritating conditions which culminated in the almost utter impossibility to get billets in 1901 and 1902 made plain to the management that if it desired to continue and grow in business it would have to be independent of these conditions. In May, 1902, ground was broken for the new plant, and by September, 1903, the mill was completed and in successful operation, although trial heats had been run off a couple of months earlier. The plant as completed consists of two 40-ton Wellman basic open-hearth furnaces of the stationary type, and one 36-in. two-high blooming mill.

Many interesting features are shown in the construction of the mill. To produce economically so small a tonnage of billets and at the same time build a plant that could readily be expanded into one of larger output, it was necessary to resort to special construction. Usually where a small tonnage of billets has been required small ingots have been made to permit of the investment account being kept within reasonable limits. The use of small ingots and light equipment, however, is a serious obstacle to the development of a large and economical plant, and the conversion costs are necessarily much above the average modern practice of rolling from large ingots.

Careful study of the problem indicated that in order to produce 200 tons of 1¾-inch billets a day with proper economy, it would be necessary to operate not more than two open-hearth furnaces and that the rolling should be done with a single crew of men in one shift of 12 hours. It was also found that a large ingot weighing not less than 4,700 lbs. must be rolled to 1¾-inch billet direct in one piece in one mill, and with one engine. So far as known, neither in the United States nor in Europe, has this been done before, and for this reason the Grand Crossing Tack Co.'s mill and practice are of special interest. The blooming mill is perhaps the most striking feature of the plant. It reduces the 4,700 lb. ingots to 1¾-in. square billets without reheating and in one pair of rolls. The mill is of the reversing type and the ingot is reduced in the usual manner down to a 4-in. square section. From this point the reversing ceases, the engine being operated continuously in one direction. By means of a system of repeaters the metal is conducted around one of the blooming mill housings, entered into the successive passes and finished in one piece about 450 feet long, and delivered to the run-out to be sheared into 30-ft. lengths.

FIG. 2.—CASTING SIDE OF OPEN-HEARTH PLANT.

The rolling progresses rapidly, there being no difficulty in rolling twelve ingots per hour, although the mill has been in operation but a few months.

This repeating system is a modification and improvement of what was already in use in several bar mills of the Central West. The idea of using it in the manner adopted was suggested by E. W. Hutchinson, superintendent of the Grand Crossing plant, and was elaborated upon and executed by the Morgan Construction Co., Worcester, Mass.

Another feature contributing to the success of this plant is the three-cylinder blooming mill engine, the first of its type to be used for this purpose in the United States. This engine has three cylinders 1,000 mm. diameter by 1,000 mm. stroke, and was built by Messrs. Ehrhardt & Sehmer, of Saarbrucken, Germany. It was selected by E. W. Hutchinson, who, by the advice of and in company with officers of the Morgan Construction Co., Worcester, Mass., made a special trip to Germany for the purpose of seeing similar engines in operation. The distribution of effort on the three cranks of this machine imparts a nearly uniform turning moment, and admits of high speed. The power developed by engines of this make in the various stages of reducing the ingot was illustrated with reproductions from continuous diagrams in an article by Victor E. Edwards in *The Iron Trade Review* of Sept. 3, 1903.

The construction of the steel plant was in the hands of the Morgan Construction Co., who acted in the capacity of consulting engineers as well as contractors for various portions of the work. The Wellman-Seaver-Morgan Co.,

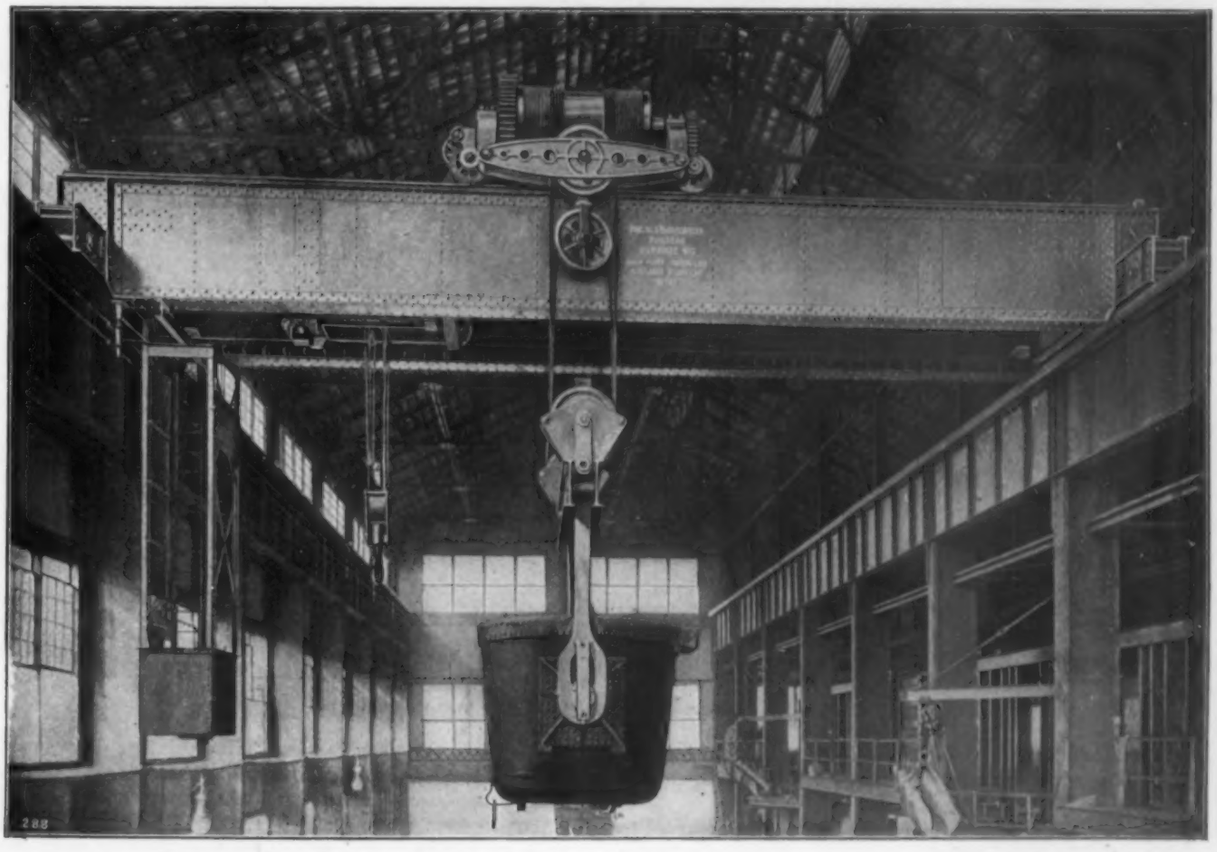


FIG. 3.—75-TON PAWLING & HARNISCHFEGER LADLE CRANE IN OPEN-HEARTH BUILDING, WITH 25-TON AUXILIARY HOIST.

of Cleveland, built the blooming mill for reducing the ingots to 4-inch billets, while the Morgan Construction Co. put in all the auxiliary machinery necessary to reduce the 4-inch billet to 1¾ inch, as well as the gas producers. The latter company also put in the run-out tables, ingot cars, ingot run and shear run.

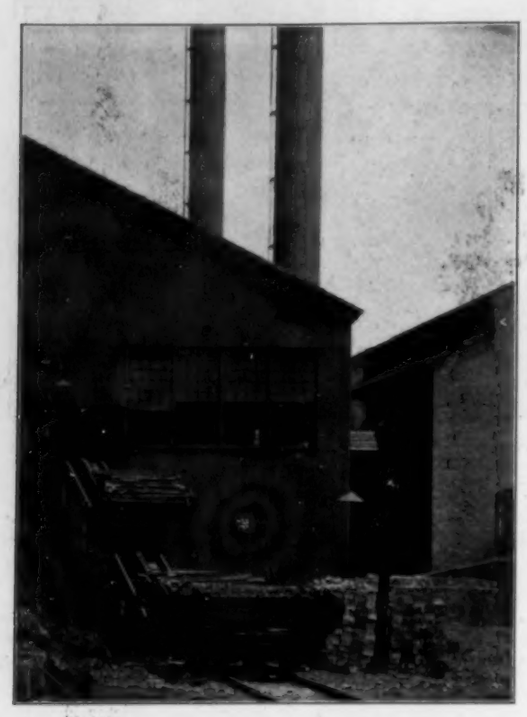


FIG. 4.—OPEN-HEARTH DEPARTMENT. INCLINED RAILWAY TO CHARGING PLATFORM.

The soaking pits, of which there are two, each having four holes, with a total capacity of 48 ingots, were built by the Wellman-Seaver-Morgan Co. These are served by a traveling ingot crane, the re-heated ingots being delivered to the blooming mill tables on a buggy operated by trolley. The ingots are stripped by a 50-ton Wellman electric stripper.

The two basic furnaces of the melting plant are served by a 75-ton ladle crane equipped with a 25-ton auxiliary trolley, made by Pawling & Harnischfeger, Milwaukee, which is shown in Fig. 5. The crane travels between and on the bottom flanges of the crane girders. The bridge is riveted box section and the cage specially lowered to secure the best point for operation. The bridge span is 47 ft. 4 in.; main hoist lift, 25 ft.; voltage, 220. The speeds in feet per minute are as follows: Main hoist—Full load, 10; light, 25. Main trolley travel—Full load, 50; light, 75. Auxiliary hoist—Full load, 20; light 50. Auxiliary trolley travel—Full load, 100; light, 150. Bridge travel—Full load, 200; light, 250. The charging buggies are drawn on to the charging platform by an endless link-belt chain, and the material is charged into the furnaces by a Wellman charging machine. Six Morgan gas producers supply gas to the furnaces.

The Grand Crossing Tack Co. started in 1883 in a frame building, 100 x 38, on the site occupied by the present large building at 79th street and Stoney Island avenue. Its output at the beginning was less than half a ton a day. The company was organized originally to manufacture plate tacks and started in business with ten tack machines and about a dozen employes. It now employs 600 hands at the Grand Crossing plant and 250 in the steel works at Hutchinson, while its product has increased until it requires a catalogue of nearly 200 pages to list all the items. The organizers of the company were E. W. Hutchinson, the present superintendent, and A. J. Bassett, the latter having died in April, 1902. O. N. Hutchinson, the president and treasurer, went with the firm in January, 1891, having formerly been connected with the Chicago Tack Co., a concern which the Grand Crossing firm absorbed in 1892. In 1897 the frame building mentioned above was destroyed by fire, together with nearly its entire contents of machinery. A brick building replaced the burned structure and since that time additions have been made to it as rapidly as needed.

In the manufacture of its finished product, the company has taken advantage of labor-saving machinery to so great an extent that, from the time the scrap is sheared in the scrap yard at the steel mill and loaded on to the buggies for charging into the furnace until the rolled rod is turned over to the wire drawer for the first draft, not a hand has touched the material in all its various stages, all the work and handling having been done by machinery. To be more completely independent of the market for its supplies, the company has installed a printing plant in its Grand Crossing factory and prints all the stationery, labels, pasteboard boxes, etc., that it requires. It also makes its own paste-board boxes for the shelf trade, as well as the kegs and wooden boxes, buying only the shooks in the open market.

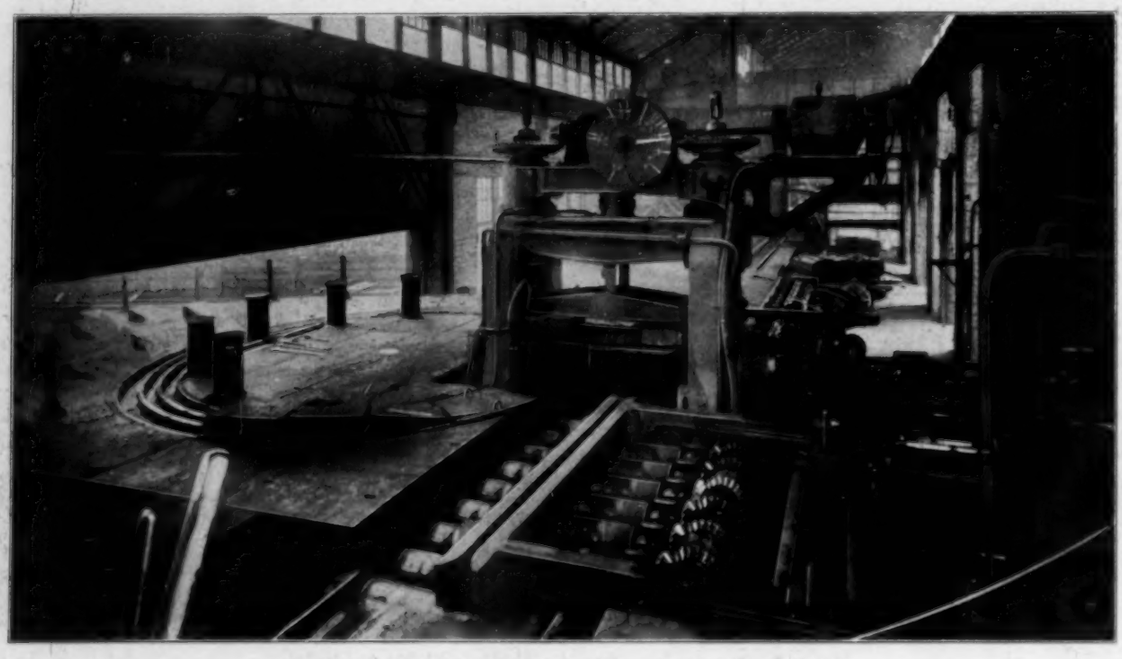


FIG. 5.—BLOOMING MILL SHOWING ROLLS AND REPEATER SYSTEM.

Of the company's output of 150 tons of rods per day, one-fourth is sold in the open market and the balance is converted into various products. Its capacity of wire nails is 400,000 100-lb. kegs per year. It manufactures 1,500 tons of plate tacks per year, 12,000 tons of galvanized wire and 5,000 tons of barbed wire per annum, as well as varying amounts of other materials. It has recently entered into the manufacture of rivets, of which it now has an output of 3,000 tons per year, making a specialty of this product.

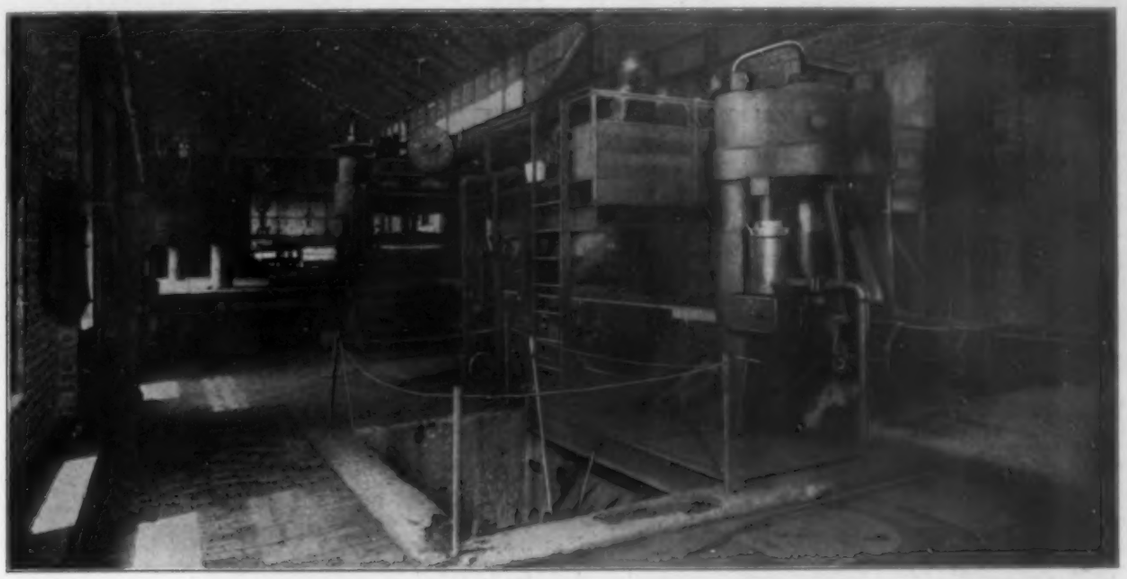


FIG. 6.—HYDRAULIC SHEARS IN BLOOMING MILL WITH PIT FOR CROP ENDS.

The engineering and contracting firm of J. G. White & Co., New York, which recently secured contracts for harbor improvements at Cebu and Iloilo, Philippine Islands, has contracted with the Lidgerwood Mfg. Co., Brooklyn, N. Y., for nine hoisting engines, and with the John A. Roebling's Sons Co., of Trenton, N. J., for hoisting cables. The American Hoist & Derrick Co., of St. Paul, Minn., has obtained an order for derrick fittings.

STEAM TURBINES.

From an engineering point of view the most remarkable feature of the past half year has been the prominence given to the steam turbine. Particulars of different variants introduced on the continent and in America have been published for the first time, whilst discussions and papers dealing with the older established types have been contributed to several of the principal engineering societies. Further, in the earlier months of the year a somewhat acute controversy as to the respective merits of the reciprocating engine and the steam-turbine occupied a large proportion of the correspondence columns of the engineering press. Still more important, perhaps, in emphasizing the growing importance of the new type of steam-mover has been the decision of the Cunard Steamship Co. to fit turbine-engines to the new liners.

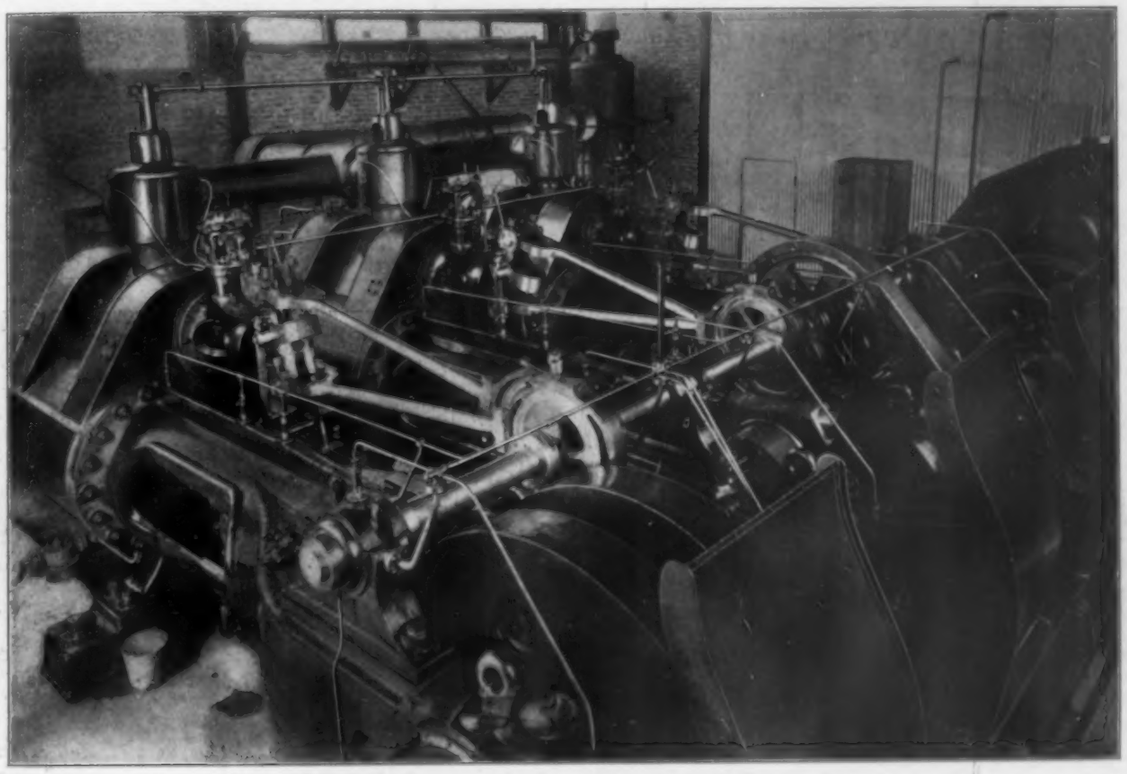


FIG. 7.—THREE-CYLINDER REVERSING BLOOMING MILL ENGINE.

One remarkable point which, so far, we believe has escaped the attention it deserves is the fact that in some of the patents

taken out sixty years ago we find clearly stated all the essential points for the construction of an excellent steam-turbine, and it is, therefore, most curious that when the correct principles of construction were so fully apprehended, nothing should have been accomplished practically till Parsons, working on entirely different lines, finally succeeded in proving that a steam-turbine could furnish power as economically as the best of reciprocating engines. A capital account of some of these early turbines is given in Mr. Neilsen's excellent work on the steam-turbine. The principal pioneers seem to have been: (1) Pilbrow, who in his patent of 1843, described motors very closely allied to both the De Laval and the Parsons type; (2) Robert Wilson, who in 1848, described the system of compounding for velocity, which has been reintroduced of late years by Ferranti, Curtis, and Riedler and Stumpf; and (3) Thomas Baldwin, who in 1873 described (without drawings) a steam-turbine apparently closely allied to the "compartment" type, which has recently been so capably developed by Professor Rateau. Many of these early inventors seem to have had such very clear ideas as to the essential features of a successful steam-turbine that their failure to make their ideas commercially successful is somewhat singular. One rock in their path may have been the relatively high cost of the accurate workmanship needed. Shafts and pins for a slow-moving pumping-engine need not be very round, nor need weights be accurately balanced; but any departure from accuracy of form in a journal required to run at some thousands of revolutions per minute is soon translated in practice into a serious breakdown. The accurate shaping of the buckets must also have been an expensive operation before the introduction of the emery wheel made the milling-machine a tool of practical value in the workshop. On the other hand, the incomplete state of the science of thermodynamics must also have greatly handicapped the early inventor. Joule's first rough approximation to the mechanical equivalent of heat was only published in 1843, and the same year saw the publication of the results of Regnault's investigation into the elastic force of steam at different temperatures. Each experimenter had, therefore, to make his experiments *ab initio*, having available none of the accurate data which are now at the service of every engineer apprentice who spends sixpence to eighteen pence on one or other of the capital little engineers' pocket-books now published. Unfortunately, the information thus tabulated, though both important and useful, is only sufficient for the design of the theoretically perfect turbine, and requires correction for the frictional losses, data as to which are the zealously-guarded secrets of those firms who have spent much time and money in effecting the commercial development of one or other of the several types of efficient steam-turbine now available.

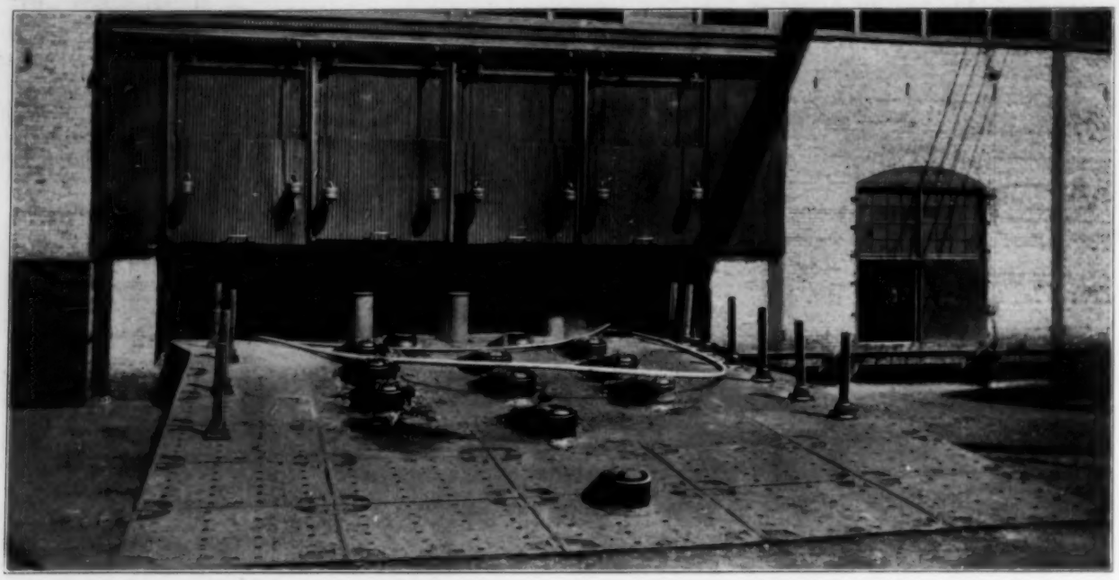


FIG. 8.—TURTLE BACK PLATFORM SHOWING METHOD OF OVERFEED.

Another difficulty, which at any rate was largely responsible for the slow development of the Parsons turbine, lay in the fact that this type gives relatively poor results unless of a fairly large size. On the other hand, in developing a new machine it is natural to start on a small scale, as was done in the present instance. The steam economy reached by these was but moderate, and it was, therefore, not surprising that the possibilities of this type of motor were ignored by engineers in general until the publication of the Cambridge tests in November, 1892. The significance of these was emphasized by the dramatic success of the Turbinia. The engineering world heard little of this boat until she had beaten every record for speed then in existence. In other new departures in engineering practice the puff preliminary has often prepared an expectant world for a success not always realized, and some of our American friends have showed themselves

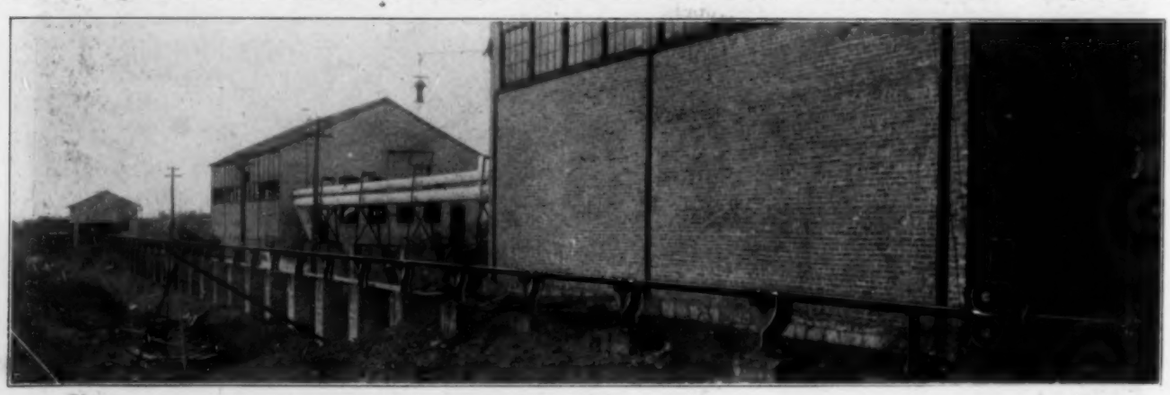


FIG. 9.—RUN OUT FOR FINISHED BILLET. SHEAR HOUSE IN DISTANCE.

adepts in this method of obtaining publicity. The plan, however, has its drawbacks, as in the case of the cast-steel gun experimented with in the United States a few years back. The manager of the works constructing it accorded weekly interviews to press representatives, in which he dilated on his intention to render obsolete the great ordnance-making establishments of Europe, only to have his hopes frustrated by the bursting of the gun the first time it was tested. In building the Turbinia, the Parsons Marine Syndicate took no such risks, although they must have been morally certain of success. This reticence, as it turned out, was particularly fortunate, as unexpected difficulties in connection with the screw propellers long delayed the attainment of the desired goal. Since the final successful trial of this boat, however, engineers, whether, like Admiral Melville, they still prefer the reciprocating engine, or, like the advisers of the Cunard Co., they have been converted to turbines, have, at any rate, been compelled to admit the claims of the new prime mover to a most respectful consideration.

In many respects the path of the De Laval turbine towards recognition has been easier than that of its old rival. Introduced first for running milk-separators, no exceptional steam economy was requisite in order to make the device of substantial value. Nevertheless, too much credit cannot be given to Dr. De Laval for the ingenious manner in which he overcame, one by one in the simplest way, the difficulties to be met with in making his turbine competent to meet its older rival in a less restricted field. A somewhat remarkable feature in this turbine is the extraordinary difference in the efficiency of the small and large sizes. Thus, with a 30-horse-power turbine taking steam at 125½ lbs. per square inch, and exhausting at a vacuum of 25½ inches of mercury, the steam consumption was about 22 lbs. per brake horse-power-hour, whilst with a turbine of 300 horse-power, taking steam at 150 lbs. per square inch, and exhausting on a vacuum of 25¼ inches of mercury, the steam consumption was about 15 lbs. per brake horse-power. From Willan's curve the ratio of the "indicated" to the brake horse-power seems to be about the same in both, 8 horse-power being wasted in wheel and gear friction in the one case, and about 80 horse-power in the other. The nozzle losses cannot be very different, and the work due from the steam is only some two or three per cent. greater in the case of the larger wheel, owing to the greater pressure used. The bucket angles being different in the two cases, the amount of energy carried away, owing to the residual velocity of the steam, will be somewhat less in the case of the larger turbine; but this is not sufficient to account for the wide discrepancy in the steam consumption of the two. In the case of the Parsons type of turbine the leakage area is relatively much more important in the case of small turbines, so that the better performance of the larger units is readily intelligible; but in an impulse-turbine of the De Laval type there is, or should be, no loss from leakage. It is possible, however, that the discrepancy may be due to disturbances arising from the fact that it is necessary to make the bucket walls of finite dimensions in place of the mathematical abstractions which theory shows they ought to be. It is easy to understand that these may be relatively much greater in the case of small wheels. These disturbances will cause loss from the production of eddies in the flow of steam, and may also cause a certain amount of leakage due to a sideways spread of the steam after striking the edge of the bucket.—[Engineering.

The Reeves Mfg. Co., New Haven, Conn., has leased additional floor space and will begin the manufacture of gas meters in addition to its automatic attachment for meters. The capital has been increased from $50,000 to $250,000.

The Mark Mfg. Co., Chicago, is now operating its four furnaces at Zanesville. Three furnaces are running on iron and steel lap welded pipe and the manufacture of boiler tubes has just been commenced.

The Rawton, Morrison Co., Cambridge, Mass., has purchased the business of the John A. Mead Mfg. Co., Rutland, Vt., which manufactures coal carrying machinery. The two companies have been consolidated as the Mead, Morrison Mfg. Co., with offices at Cambridge.

A NEW PORTABLE ELECTRIC DRILL.

The Cincinnati Electrical Tool Co. of Cincinnati, manufactures a neat hand drill. It is simple in construction and all parts are made interchangeable. The tool is made by the company in its own shop and in three sizes, furnished with chucks holding drills from 0 to ¼ in., 0 to ⅜ in. and 0 to ½ in., the latter size, where this is preferred, is made with two speeds.

The drill is centrally located and the tool is evenly balanced in all its parts and the switch controlling the motor is located in one of the handles. The motor is shunt-wound and consists of a number of soft laminated steel punchings and is designed to take care of heavy or sudden loads. The commutator is made of the highest grade of tempered copper, insulated with India mica of such character as to wear evenly with the surface of the copper. The shaft is of tool steel, hardened on the bearing ends and ground. The journals are made of special hardened phosphor bronze and are interchangeable. Ball bearings are used to take up the thrust. Windings are made of the highest grade of silk-covered magnet wire, in both armature and fields; each drill contains more than one mile of this class of wire. The case is of seamless cold-drawn tubing, finished in three coats of flexible enamel varnish, each separately and thoroughly baked. Ventilating air is admitted through a gauze-covered aperture at one end of the machine and by the fan action of the armature is expelled through a similar opening at the drill end. A swinging cap is provided, so that the commutator can be easily cleaned without taking the machine apart. The brushes are easily removed externally and can be readily replaced by the operator merely slipping them into a cap provided for the purpose.

The operating switch is in the handle on the right, and when the tool is employed for corner or angle drilling the

A NEW ELECTRIC DRILL.

left handle can be removed. A breastplate is furnished instead of the combined handle and breastplate when this change is desirable.

Work has been resumed at the Seneca Chain Works, Kent, O., and there is a good prospect for steady business. At a meeting of the stockholders the following directors were chosen: M. G. Garrison, E. E. France, J. E. Richardson, H. H. Line, F. H. Merrell, Charles Mehrle, C. D. Livingston, D. L. Rockwell and C. M. Power.

The Ludlow-Saylor Wire Co., St. Louis, has recently acquired additional land for future needs. The company is installing galvanized netting machinery and will need more space for this class of goods. It is building its own machines and therefore not in the market for equipment. The boiler capacity has been enlarged.

The Japanese in Tokyo are not so busy celebrating victories that they have no time left for the arts of peace. The following message has lately been received by an American manufacturer of electric generators and motors:

Tokyo, Japan.

Messrs. Crocker-Wheeler Co., Ampere, N. J., U. S. A.

Gentlemen: I beg you please to send me a copy of your precious catalogue, which I have great interest, as I shall commence some trifling business for the electrical engineering in after a few months, if you favor it for me I should be in great thankfulness.

Very truly yours,

NEW BORING, MILLING AND DRILLING MACHINE.

This horizontal floor boring, milling and drilling machine of improved type has recently been designed and built by the Espen-Lucas Machine Works of Philadelphia. The tool conforms in its principal features to the more expensive and larger machines, but is able to do the boring and a large amount of the milling frequently accomplished on the long miller. It covers an unusually wide range and a great variety of work, being applicable to all kinds of boring, tapping, reaming and milling. Such operations as the keyseating of long and heavy shafting for short distances is easily handled on this machine and the tool can be employed for face milling with a rotary cutter head similar to the ordinary rotary planer, and will serve for cotter drilling and cutting keyseats with end mills. Large castings may be placed on the platen and all work finished without shifting the casting.

Two views are shown of the machine, Fig. 1 illustrates the tool as stripped for heavy work and Fig. 2 presents a view of the machine with the outer bearing for main spindle and the supplementary platen in position for much lighter operations. The two ilustrations depict the range of the machine very clearly.

The spindle is made of hammered crucible steel and is four inches in diameter. The spindle slides through a gun metal sleeve. The boring bar has 24 inches feed, has a No. 6 Morse taper hole in the end and has a pin hole for doweling the bars and milling tools securely in place. The head has a vertical adjustment of 30 inches and may be rigidly clamped in any position for milling purposes. The column carrying the spindle has an automatic feed and quick return in both directions, giving 42 inches of horizontal movement to the spindle head for milling. The spindle has feed in either direction for service in boring and counterboring such work as the two ends of cylinders, etc. The machine supplements the old style boring machine where the work had to be adjusted to the spindle instead of the spindle being adjusted to the work, a difference which increases in importance with the size of castings, forging, etc., and also relieves the standard milling machine of some work which would require heavy tools. The spindle is powerfuly geared for heavy work and has ample power for drilling. There is a five-step cone and equipment for eighty changes of feed and twenty changes in speed. The gearing is made of steel and cut from the solid. The bearings are all lined with bronze. The tool may be built with plain or compound table or with both. The platen is 42 by 84 inches and well ribbed to carry large and substantial work. The tail support is built with or without horizontal adjustment. Accurately adjusting screws and micrometer dials are also attached to the machine when requisite. The countershaft is so arranged that the spindle can be run in either direction. The length and width of the table as well as the length of movements in all directions can be increased to suit requirements of the customer.

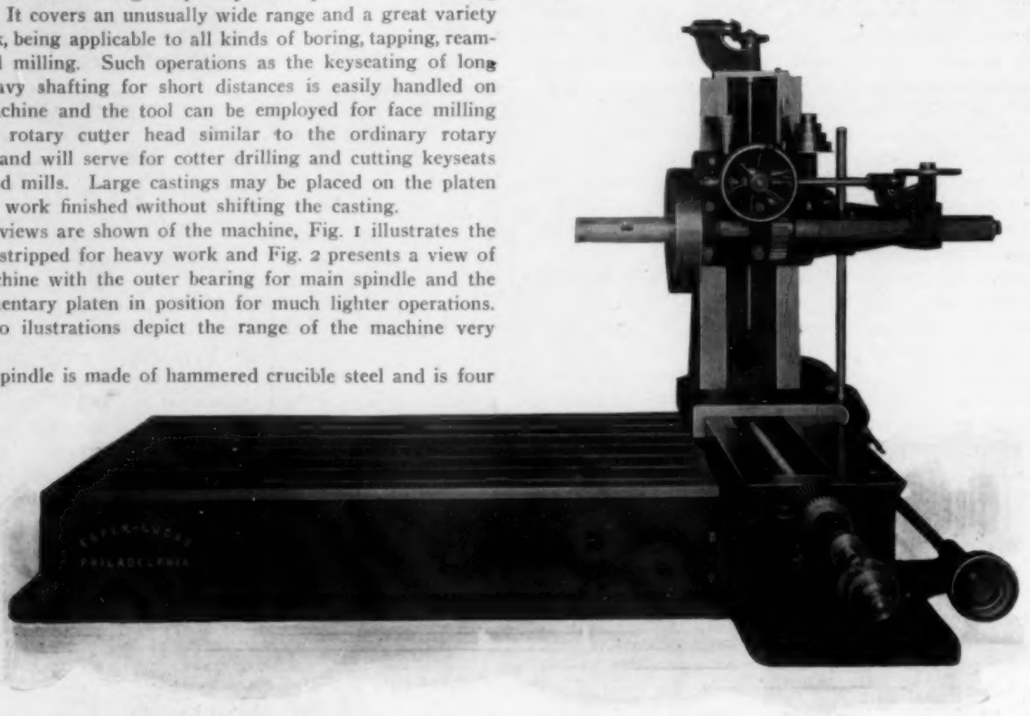


FIG. 1.—A NEW HORIZONTAL MILLING AND BORING MACHINE.

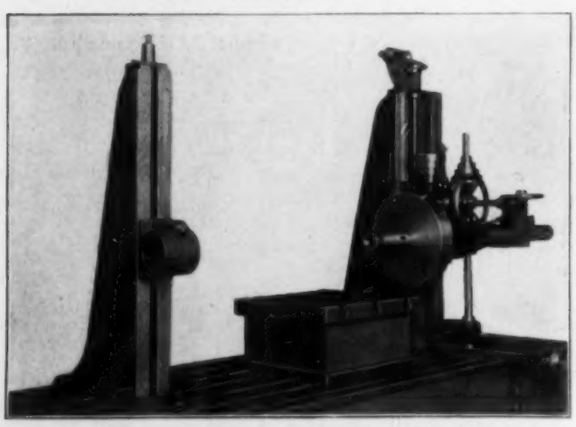


FIG. 2.—OUTER BEARING AND SUB-TABLE APPLIED TO HORIZONTAL BORING AND MILLING MACHINE.

The annual meeting of the Mahoning Foundry and Machine Company, Youngstown, O., was held last week. The following were elected directors and officers: G. M. McKelvey, L. E. Cochran; Charles R. Darrow, president and general manager; Mason Evans, vice president, and Frederick G. Evans, secretary and treasurer. This company makes a speciality of chemical works castings, blast furnace and rolling mill machinery and castings.

Internal dissension among the stockholders of the Cramp Steel Co. in regard to the method of reorganizing the company has resulted in the application for an injunction in Canada to restrain one faction from selling assets of the Cramp Steel Co. to the Northern Iron & Steel Co. It is expected that some amicable arrangement will be reached which will avoid a receivership for the property.

The stockholders of the Eastern Steel Co., Pottsville, Pa., at their special meeting held last week ratified the proposition of the directors to increase the capital stock of the company from $5,700,000 to $9,400,000. In addition a resolution was adopted increasing the indebtedness $2,500,000. The money will be used to complete the large new plant at Pottsville.

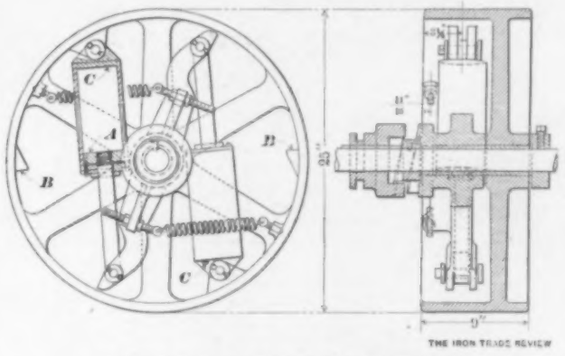
Vice Chancellor Stevens, of Newark, has vacated a temporary injunction restraining the Standard Chain Co., a $3,000,000 corporation, from voting to reduce its capital stock by half. Robert Rigney, of New York, holder of twenty-five shares of preferred stock, was the complainant. He alleged the reduction would not be to the interest of stockholders.

A NEW CLUTCH.

A clutch has been recently patented by William R. Smith, of Buffalo, N. Y., for relieving the starting strain upon electric motors and other kinds of motive power equipment. The engraving shows two views. The clutch is open in the view at the left and the other illustrates a section along the shaft. The device operates in the inside of the shaft pulley and consists of two levers actuating pistons or plungers A into two cylindrical air chambers provided with small vents. When the motor is started the piston plungers are forced into the air cylinders, cushioning the application of power to the shaft and making same gradual, thus neutralizing the strain and shock of starting, the working connection of the motor and the parts it has to drive being gradually and smoothly accomplished. A pull of one pound on the lever arm at starting is found sufficient to throw into operation the largest size of clutch, and it is thrown out automatically by release springs after the strain is taken up. When the air is exhausted from the cylinders, the mechanism of the clutch comes to a rigid bearing on lugs B on the inner rim of the pulley, and the pulley then rotates as a solid pulley with no possibility of the clutch slipping or wearing.

The vent C in the air chambers can be adjusted to allow the motor to make from one to several revolutions—as may be desired—before the air is exhausted and the full load is taken up.

The pneumatic clutch is especially designed for heavy motor driven machines, reversible rolling mill machinery, large planers, etc., as well as being effective and useful wherever the quick starting of machinery throws a severe strain



A NEW CLUTCH WITH DASHPOT ADJUSTMENT.

upon the motor, such as direct connected electric elevators, electric cars, etc. Its use upon street cars will decrease the annoyance to passengers when the motorman throws on the current too suddenly and will prevent accidental damage to gearing from the same cause.

This clutch has been in practical operation during the past six months in the factory of the Buffalo Leather Co., of which Mr. Smith is president, and its advantages tested. A company is being organized and the manufacture of the device will, it is announced, soon be commenced at Buffalo, where a factory will be built.

The officers of the firm of E. J. Gordon & Co., Big Rapids, Mich., recently organized to put on the market a hot blast grate for steam boilers, are: V. H. Hanchett, manager; Dr. W. T. Dodge, W. N. Ferris, E. J. Marsh, Douglas Rohen and J. C. Jensen. The grate was manufactured at the Michigan Heater Co.'s plant.

The Flickinger Wheel Works, Galion, O., were sold July 22 by the receivers. The real estate was bought by R. N. Johnston, of the Ohio Buggy Co., for $13,000, and the machinery for $25,000, by John W. White, president of the White National Bank, Ft. Wayne, Ind.

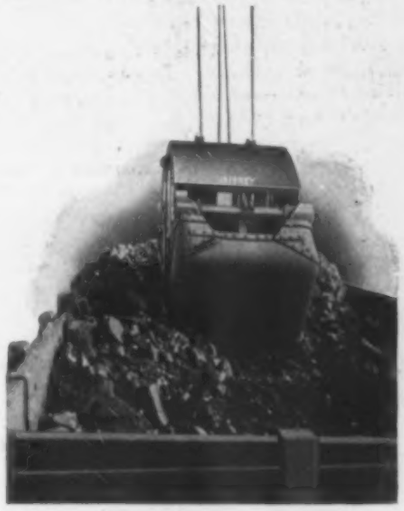
Application has been made for the appointment of a receiver for the Ruth Knitting Machine Mfg. Co., of York, Pa. A rule to show cause why the receiver should not be appointed was made returnable September 5.

THE JEFFREY GRAB BUCKET.

The illustration shows the "A" grab bucket recently brought out by the Jeffrey Mfg. Co. of Columbus, O., for handling lump and run-of-mine coal. Its path is such that it is absolutely self filling under all conditions and the weight of the enclosed coal assists the bucket to close. The lines on which power is applied are such that the entire weight of bucket and load is utilized at closing with sufficient force to crush the largest lumps should they come between the scoops.

These buckets are made in the most substantial manner to withstand hard usage, and in sizes of from 15 to 160 cubic feet capacity, and are used in unloading coal of any commercial size from cars, vessels or barges, for shipment or stocking, also for reloading from storage piles.

Four giant steel towers of the Long Island City power house of the New York and Long Island Railroad Co. have risen to their full height of 290 feet and are prominent land marks for a distance of four or five miles up and down the East river and the shore front of Manhattan. The steel frame of the power house has been raised to a height of over 100 feet. The entire work is being done under the direction of Westinghouse, Church, Kerr & Co. The entire plant in the completed building will have twelve steam turbine engines and dynamos of 7,500 horsepower each. A duplicate plant of the same size will be



A JEFFREY GRAB BUCKET.

built at Weehawken, N. J., and either will be capable of operating the entire railroad system of the tunnel in case the other gives out.

The annual meeting of the Bethlehem Steel Co. will be held in Philadelphia on August 11. The directors will be elected and stockholders will be asked to ratify an amendment to the by-laws allowing the stockholders present at any annual or special meeting, even though they do not constitute a majority of the stock of the company, to adjourn for any period not exceeding sixty days.

The Battle Creek Iron Works Co., Battle Creek, Mich., held a meeting last week and decided to reorganize and reduce the stock from $600,000 to $100,000. Provisions will also be made for a rebonding to take up the present outstanding bonds, pay off the company's debts and provide a fund with which to carry on the reorganized business.

The Lobee Pump & Machinery Co. and other creditors of the Lackawanna Motor Company of Buffalo have instituted proceedings in involuntary bankruptcy in the United States district court. An act of bankruptcy is alleged in that on July 25th the company obtained through the State court the appointment of William C. Carroll as receiver in proceedings for voluntary dissolution.

The Lookout Mountain Iron Co.'s Blast Furnace Plant at Battelle, Ala.

The Lookout Mountain Iron Co. was organized in April, 1902, under special charter from the State of Alabama, with a capital stock of $1,000,000, to acquire and develop some 15,000 acres of coal and iron ore lands lying in a contiguous body and situated in De Kalb County, Alabama, and the adjoining Dade County, Georgia. The charter of the company is a valuable one and could not now be duplicated since the new constitution of the State of Alabama went into effect.

The directors of the company are: J. G. Battelle, president of the Columbus Iron & Steel Co., Columbus, O.; J. A. Andrews, president of the Newport Rolling Mill Co., Newport, Ky.; H. A. Marting, president of the Marting Steel & Iron Co., Ironton, O.; D. B. Meacham, president of the Cleveland Furnace Co., Cincinnati, O.; J. H. Frantz, treasurer and general manager of the Columbus Iron & Steel Co., Columbus, O.; Jas. Bowron, vice president of the Dimick Pipe Co.; C. B. McCormack, president of the American Trust & Savings Bank and of the Ivy Coal Co.; Erskine Ramsay, vice president and chief engineer of the Pratt Coal Co., and Jas. L. Gaines, late asistant general manager of the Tennessee Coal, Iron and Railroad Co., of Birmingham, Ala. J. G. Battelle is president; G. B. McCormack and Erskine Ramsay, vice presidents; Jas. Bowron, chairman; J. F. Stiens, secretary and treasurer; C. E. Bowron, general superintendent and Jno. Dowling, furnace superintendent. The last three are at the plant and main office of the company at Battelle, Ala. This is on the main line of the Alabama Great Southern Railroad (Q. & C. system) 33 miles south of Chattanooga, Tenn., and 109 miles north of Birmingham, Ala.

The railroad runs northeast and southwest through Wills Valley, which is about one quarter of a mile wide at Battelle, the valley being bounded on its east side by Lookout Mountain rising 1,000 feet above the railroad and on the west side by a foot-hill or ridge rising 200 feet above the railroad and locally called the "Ore Ridge." The property of the company extends from Sulphur Springs, Ga., three miles north of Battelle to Valley Head, Ala., six miles south of Battelle, lying largely along Lookout Mountain but including the valley and ore ridge in the vicinity of Battelle.

The company's property on Lookout Mountain is underlaid by a seam of fine coking coal, 36 in. in thickness, and outcropping the entire length of the property along the brow of Lookout Mountain and extending eastwardly the breadth of the mountain from four to six miles, outcropping again on its eastern escarpment. The entire property of the company is underlaid by a vein of fossiliferous red hematite ore from 4½ to 5½ feet in thickness, this outcropping at the western base of the Ore Ridge, dipping eastwardly under the Ore Ridge, Wills Valley and Lookout Mountain, forming a basin and reappearing on the eastern side of Lookout Mountain where it is being also worked.

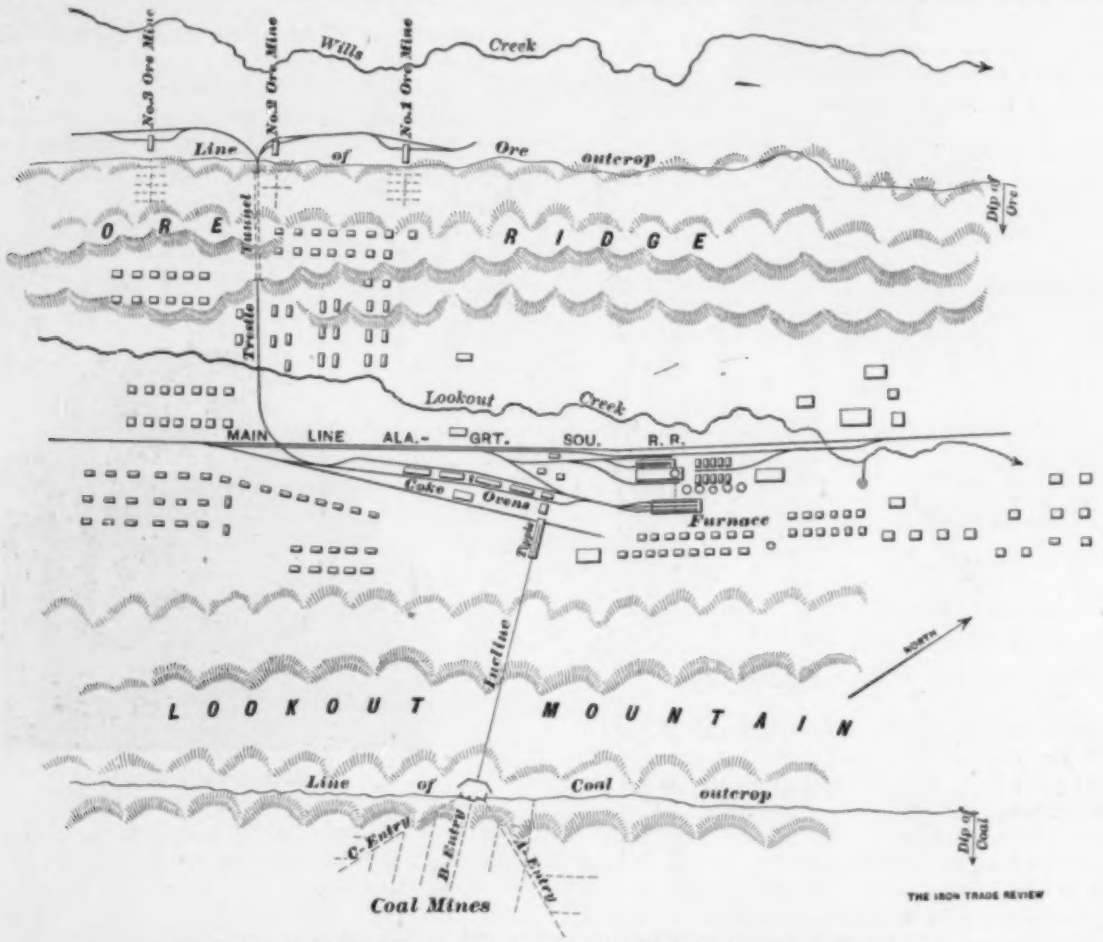


FIG. I.—MAP OF LOOKOUT MOUNTAIN IRON CO. PROPERTIES AT BATTELLE, ALA.

It is believed that this conjunction of a workable seam of coal and workable vein of ore within a stone's throw of each other and of the furnace plant constitute an entirely unique proposition in the iron world and one which is only approximated at a few other favored plants. This has permitted a layout which will enable the company to obtain its entire supply of these raw materials without the payment of one cent for royalty or railroad freights.

In addition to the seam of coal which is being developed there are one if not two other seams of workable thickness outcropping at either extremity of the property but which have not yet been exploited in the immediate vicinity of the present mines. There are also two veins of ore

from 24 in. to 30 in. in thickness outcropping below the main vein which are valuable for their outcrop ore, this being easily mined. At the base of Lookout Mountain and above water level there is a stratum of Bangor limestone several feet in thickness and of good quality which will be worked if desired. Ample water supply for all purposes is obtainable from a creek in Wills Valley and a second creek at the western base of the Ore Ridge and in addition there are several large springs along the base of Lookout Mountain used for the supply of domestic water. All timber required for the coal and ore mines, etc., is easily secured from the company's own lands.

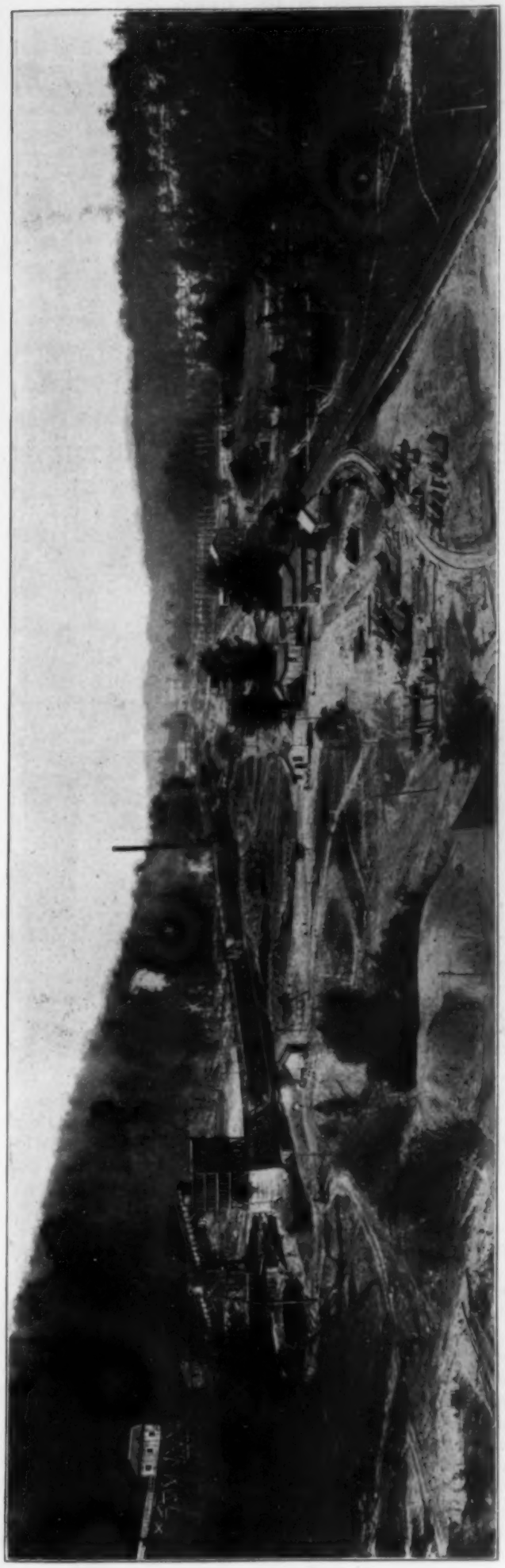


FIG. 3.—GENERAL VIEW, LOOKING SOUTH FROM TOP OF FURNACE.

Ore Ridge. Coke Ovens. Coal Tipple and Washer and Washed Coal Bin. Lookout Mountain.

The map shows the general layout of the coal and ore mines, coke ovens, furnace plant, etc. Work was actively begun in October, 1902, at the coal mines and on the coke ovens, tenement houses, etc. Ground was broken for the furnace on Feb. 23, 1903. The coal mines and coke ovens have been in operation for some months and the ore mines and blast furnace are expected to go into operation within sixty days.

Coal Mines.

The coal seam is locally known as the Eureka and it is being also worked at several places along the Cincinnati Southern Railroad under other names. Three main entries are being driven, one going directly southeast with the dip and one on either side at an angle of 45, the three converging to one central tipple and constituting the main haulage and air ways for the mines. From these main entries room entries are driven and from these rooms are turned in the usual manner of room-and-pillar working. The top is usually slate, although at times the overlying sandstone comes right to the coal. The present developed capacity of the mine is about 400 tons. Harrison air-operated coal punching machines of the P. G. type are used for undercutting the coal and where the roof is sandstone, air drills are used in taking it down in the entries. The dip of the seam averages about 5 percent for 1,000 feet when the basin is struck. Cameron pumps are used for draining the mines and these together with all other machinery at the mines are operated by compressed air which is sent up the mountain from the power house at the coke ovens. It is intended ultimately to operate the pumps, engines and fan with electricity to be generated at the power house. The mines are ventilated by an air shaft and 10 ft. Brazil fan. The coal is hoisted by three Flory geared hoisting engines with single friction drum, the empty cars being lowered by gravity to the basin when they are handled by mules to the rooms.

Coal is lowered down the mountain by a self-acting gravity incline 2,300 ft. long, this being three-rail on top, two rail on the bottom and double track passing track in the middle, with automatic switch, the incline being laid with 60-pound rail. Two incline cars are used, each having a capacity of eight tons of coal and being attached to an 1¼-in. rope which passes around two 8-ft. drums on top, these drums having two powerful band brakes, also a fan governor for controlling the speed of the trips. A trip is made in three minutes. The top tipple at the mines has a bin holding two hundred tons, the incline cars being filled through doors in the bottom of bin. The incline has an electric signal and telephone.

The bottom tipple is provided with a bin holding 100 tons of coal and is so arranged that the coal may be either screened and shipped, the screenings being either loaded or sent to the coal washer, or the entire output may be sent through the crusher and washer as is being done at present. The crusher is a No. 3 Williams and is so arranged that only the coal passing over a 2½-in. bar screen is crushed, the screenings passing down a chute through the crusher foundation to the elevator taking the crushed coal to the washer. The coal washer is a two-tub Robinson-Ramsay washer with sludge tank and two No. 9 pulsometer steam pumps. The washed coal is car-

ried from the washer to a 500-ton washed coal bin by conveyors provided with perforated bottoms of manganese bronze to drain the coal. The crusher, washer and conveyors are all driven by direct current motors, current being supplied from the power house at the coke ovens.

Coke Ovens.

There are 150 beehive block ovens in four batteries. They are 12½ feet in diameter and 7 ft. 8 in. high. A space of 50 feet is left between the batteries for the location of boiler plants, one space being so utilized at present. The larry track runs down the center of the batteries, being standard gauge and of 100-lb. rail, the rails being supported by brick pillars built independently of the oven brick work. The pillars are provided with cast iron caps on which rail ties of 60-lb. rail rest and support the 100-lb. rail. The 100-lb. rail is secured to the 60-lb. ties by iron clips, allowing free expansion. The coke oven wharves are 12 feet wide and are designed for direct loading of coke into railroad cars as it is pulled without any intermediate handling, which will allow a considerable saving in the cost of loading over the ordinary wide yard and which will also cut down the production of breeze to a minimum. The coke will be handled to the blast furnace in hopper-bottomed cars of 20 tons capacity, the average length of haul being 1,800 feet and the grade being in favor of the loads. The ovens are charged by two seven-ton double side discharge larries electrically operated. The firebrick used in building the coke ovens came from the Bessemer Fire Brick Co., Bessemer, Ala., and Montague & Co., Chattanooga, Tenn., and the stone for walls came from the company's property.

Power House.

This is of brick 30 ft. by 95 ft. with an iron covered wood truss roof. It contains two Rand duplex compressors type 10 with 18-in. simple steam ends, 28-in. and 17-in. air ends and 24-in. stroke, each having a capacity of 2,394 cu. ft. of free air at 140 r. p. m. These discharge into a receiver 60 in. x 18 ft. from which an 8-in. air line goes to the coal mines and a 5-in. line to the ore mines. There is also a 65-k. w. Crocker-Wheeler direct current generator belted to a 14 x 12 in. automatic Ball engine, furnishing current for the washer motors, coke oven larries and lighting. Space is provided in the power house for two additional air compressors and two additional generators. The exhaust steam is sent to a 700- h. p. Cochrane heater or by-passed through an exhaust head. The plant is provided with Cochrane separators, oil filters, etc.

Steam is provided by two Wickes 250-h. p. vertical water-tube boilers located between the second and third batteries of coke ovens, the power house being located just opposite this point 150 ft. away. The second battery of ovens is provided with a flue running the full length of the battery, the flue having a connection to each oven and being connected at its extremity to the boiler fireboxes. In this way the waste heat and gases from the ovens are utilized under the boilers for the generation of steam, replacing coal firing and allowing a very economical power production, it being estimated at another plant that the equivalent of 10 h. p. can be obtained from each coke oven connected to the flue, provided that the ovens are drawn and charged regularly with 48 hour charges.

The machine shop is temporarily installed in one end of the power house and its equipment includes a lathe, drill press, pipe and bolt-cutting machines, etc., all operated from an electrically driven main shaft.

Iron Mines.

Three slopes have been driven on the vein, dipping from 30 to 45°, each slope being now about 200 ft. deep. From either side of the slopes working headings or rooms are driven, approximately at right angles and so as to be self-draining. The slopes are driven about 10 feet wide, and the side headings about 25 feet wide, pillars 15 feet wide being left between adjacent headings and the headings being driven only 8 feet wide for a distance of about 30 feet from the slopes when they are widened out to full width. Ingersoll-Sergeant 2¼-in. arc tappet air drills are used both in slope sinking and in working the headings, the ore being too hard for hand ratchet drills. The skip system of haulage is being installed and 4½ ft. in thickness of bottom is being taken up in the slopes to accommodate the skip car, the mine cars in the headings dumping into the skip car by turnover tipples, one tipple being used for two opposite headings. The skip car will dump automatically on top into a small bin from which the ore will pass over a bar screen to a No. 7½ Gates crusher, thence into a 150-ton storage bin. Each slope is provided with individual tipple and crusher, etc., and crushed ore from the three mines will be gathered by a steam dinkey locomotive of Vulcan make in 15-ton hopper-bottom cars, passing through a tunnel through the Ore Ridge 686 ft. long, thence on a trestle across the val-

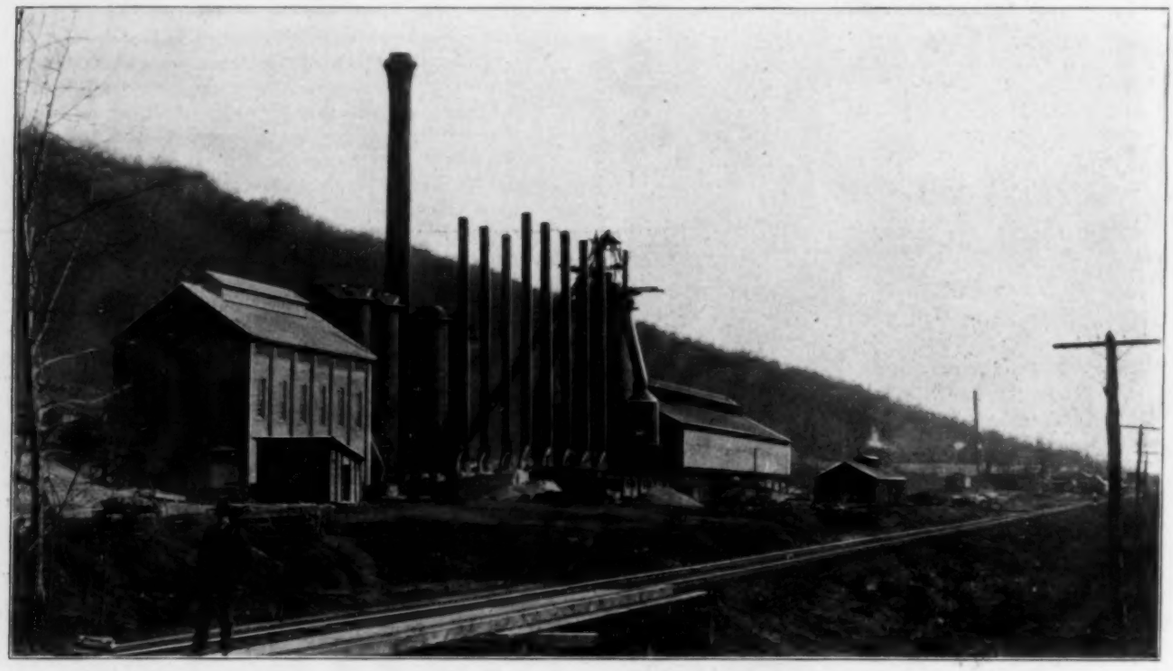


FIG. 3.—GENERAL VIEW OF FURNACE AND COKE OVENS LOOKING SOUTH.

ley and crossing the A. G. S. R. R. overhead, thence over yard tracks to the furnace stock house.

Blast Furnace.

The furnace stack is 85 ft. high with 19 ft. 6 in. bosh, 12 ft. crucible, 15 ft. stock line, 9 ft. bell, 12 tuyeres, 8 columns, I-beam mantel, cast iron tuyere and crucible jackets and bronze bosh blocks with crinoline bands. The shell of the furnace will permit a future lining one foot larger if deemed desirable. The bosh extends below the mantel and has a short steel jacket and is water-cooled with pipe coils. There are two downcomers 51-in. in the clear and two dust-catchers 14 ft. in diameter and 18 ft. high. The gas and air mains are all overhead and are provided with a number of dust-legs, the gas downtakes to boilers and stoves being also provided with cleaning and explosion doors. The furnace has two cinder notches. The bosh jacket is provided with four auxiliary tuyeres to be used in the removal of scaffolds, should these occur.

The furnace will be charged by a Brown single-track skip hoist and stock distributor of the most recent design installed by the Brown Hoisting Machinery Co. of Cleveland. The stock house is of wood 54 ft. wide and 234 ft. long and may be indefinitely extended as desired. Its present capacity is a two weeks' supply of ore and the main coke bin will hold a day's supply of coke. The stock house has three overhead tracks for unloading stock. An electrically operated transfer car built by the Wellman-Seaver-Morgan Co. of Cleveland, runs on four lines of track on the stock house floor level, reaching every part of the stock house, and the entire contents of the stock house will run by gravity into the transfer car without any handling whatever, the bins being arranged to this end.

The cast shed is of steel 70 ft. span and 240 ft. long with an umbrella extension back of the furnace, the roof being of No. 20 galvanized corrugated iron and the siding of No. 24 guage. The building was erected by the Virginia Bridge and Iron Co. of Roanoke, Va. Outside cast beds for both iron and cinder are provided for emergencies. Both the main cast shed and outside iron bed are provided with depressed iron breaking wharves and depressed tracks below the wharves, for the direct breaking and loading of pig iron without the usual transfer to an iron yard, saving thte cost of one handling.

There are four stoves with shells 21 ft. by 80 ft. high, these being lined up as four-pass Whitwell. Each stove is provided with two Morrison-Kennedy 22in. chimney valves, three 14-in. air valves, four 20-in. bottom and seven 32-in. top cleaning doors, one 18-in. gas burner and 27-in. hot and cold blast valves. The stoves are served by one central draught stack 8 ft. inside and 180 ft. high of steel with firebrick lining, the stoves connecting thereto by short underground flues.

The boiler plant includes 20 100-h. p. horizontal flue boilers, each boiler having 26 6-inch riveted flues, the shells being 72 in. x 20 ft. The boilers were built by the Brownell & Co., Dayton, O. These are set two in a battery, each battery having an individual stack 45 in. by 80 ft. high. The steam lines have extra heavy valves, flanges and fittings throughout, being furnished by the American Foundry & Construction Co., of Pittsburg, Pa.

The blowing engine house is of brick, 39 ft. wide inside and 82 ft. long, with wood truss roof covered with No. 22 galvanized corrugated iron. There are three simple blowing engines built by the Wm. Tod Co., Youngstown, O., having 46-in. steam ends, 84-in. air tubs and 60-in. strokes, with piston steam valves and mechanical inlet and outlet air valves. They are served by an overhead hand-operated traveling crane of 12 tons capacity built by the Reading Hoist & Crane Works, Reading, Pa. The exhaust from the engines goes to two 1,000-h. p. Cochrane heaters for heating boiler water. The engines are supplied with individual 12-in. Cochrane separators.

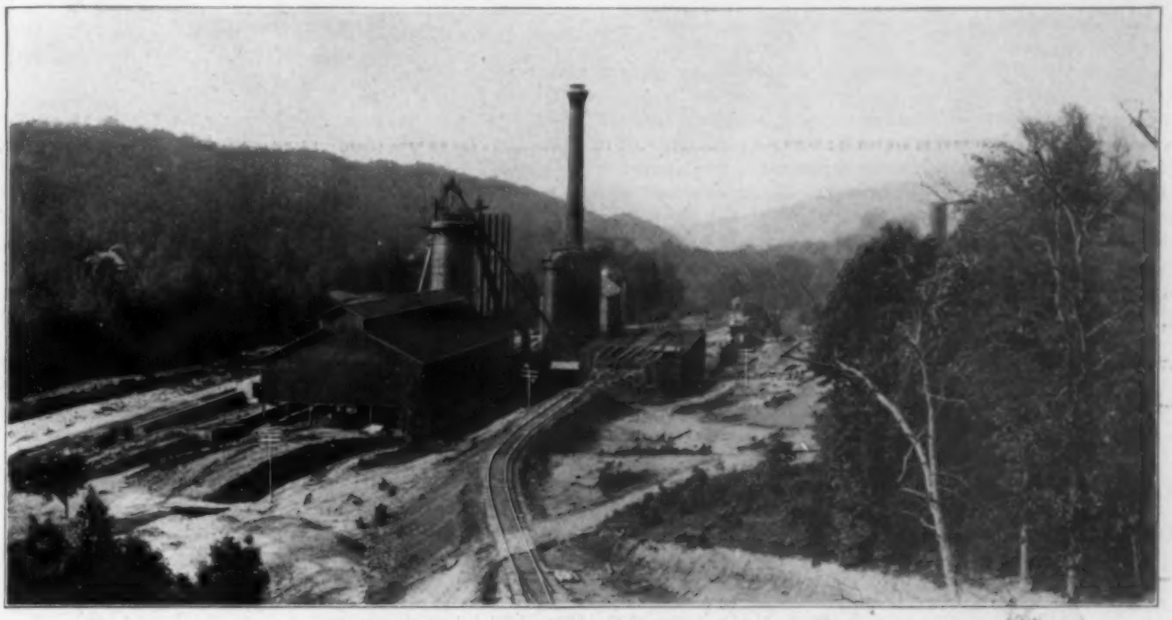


FIG. 4.—GENERAL VIEW OF FURNACE FROM TOP OF WASHED COAL BIN.

The pump house contains two Laidlaw-Dunn-Gordon waterworks pumps of 5,000,000 gallons capacity each, a 20-in. suction line bringing water to these from the creek nearby. The pump house also contains pumps for domestic water supply supplied through an independent 6-in. suction line from a 200,000-gallon spring. The main pumps discharge into a steel standpipe 20 ft. by 80 ft. high. There also two boiler-feed pumps for hot water, each 3,000 h. p. capacity.

The entire steel plate work of the furnace, stoves, mains, draught stack, standpipe and boiler stacks was furnished and erected by the Walsh & Weidner Boiler Co., Chattanooga, Tenn., and iron castings for the entire plant were furnished principally by the Bessemer Foundry & Machine Co., Bessemer, Ala., and Casey & Hedges Mfg. Co., Chattanooga, Tenn.

There are some 200 tenement houses two, three and four roomed, also two hotels for whites and one for negros. A few of these houses are located on top of the mountain but most of them are in the valley. There is also a two-story school building and church, a large store, stables, supply house, office, etc., all located in the valley.

The foundry of the Hall Mfg. Co., Austin, Minn., has been purchased by the Pishkey Brothers. The Hall Mfg. Co. will continue to operate its machine shops.

60-INCH ROLL TURNING LATHE.

The illustrations present in a comprehensive way a heavy 60-inch motor driven roll turning lathe, just built by the American Tool Works Co., of Cincinnati. In view of the extra heavy duty for which this lathe is intended, it is built extremely substantial throughout, which renders it capable of standing up under the heaviest strains. The lathe is driven by a 25 horsepower variable speed motor, which is mounted on a heavy stand at the rear of the bed and is connected to the driving shaft in the headstock by a silent chain, as shown in Fig. 2. Primary speed variation is obtained electrically, through manipulation of the hand wheel at the right hand end of carriage, which starts, stops or reverses the machine and also varies the speed by minute increments. The electrical variations in the motion of the lathe are supplemented by mechanical changes obtained through the all gear headstock, by means of the two levers shown on the front of the hood. This headstock contains an assemblage of gears oppositely disposed on the upper and lower shafts and engaged and disengaged by throwing the levers to right or left. The proper combination of the levers for any desired speed is indicated by prominently placed index plates. The range of speeds thus obtained through both the headstock and the motor is very wide, varying by minute gradations, and the levers operating the gears in the headstock are readily thrown as the operator desires by simply releasing a knob, and all danger and liability to error are eliminated—a very important consideration in the operation of these heavy lathes. The compactness and neatness of the entire arrangement of the headstock and the motor drive are well shown in Fig. 2.

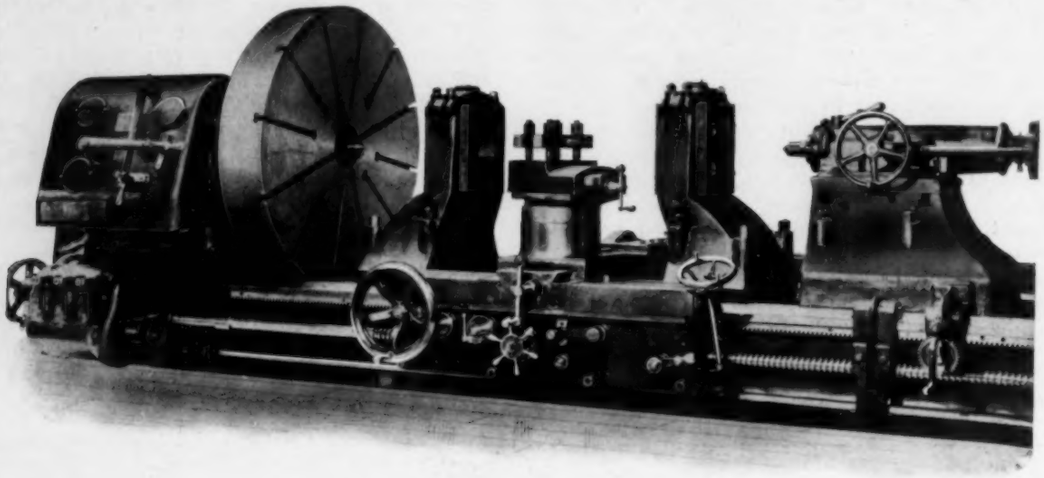


FIG. 1.—A 60-INCH ROLL TURNING LATHE.

Below the all gear headstock, on the head end of the bed, is located the geared feed changing device. Through the three levers shown at the front of the box, seven distinct and positive feeds are obtainable, without removing a single gear. The gears are mounted on two shafts and are completely housed in. Simple index plates show clearly the various combinations for obtaining any desired thread, pitch or feed.

Aside from the motor drive, the features of especial interest on this particular lathe are the roll turning attachments. The rugged housings shown are for the purpose of holding heavy pipe roll castings. At the rear of the machine and mounted on the bed is shown an interesting roll forming attachment, best seen in Fig 2, the purpose of which is to impart curved surfaces to long pipe straightening rolls. It operates on the principle of a taper attachment, a shoe, provided with anti-friction rollers, slides in a trough following master bars, thus generating the same curve on the rolls being turned. Straight work can be turned by simply disengaging nut which holds the shoe, and by tightening cross feed nut.

The concaving rest, shown in Fig. 2, is interchangeable,

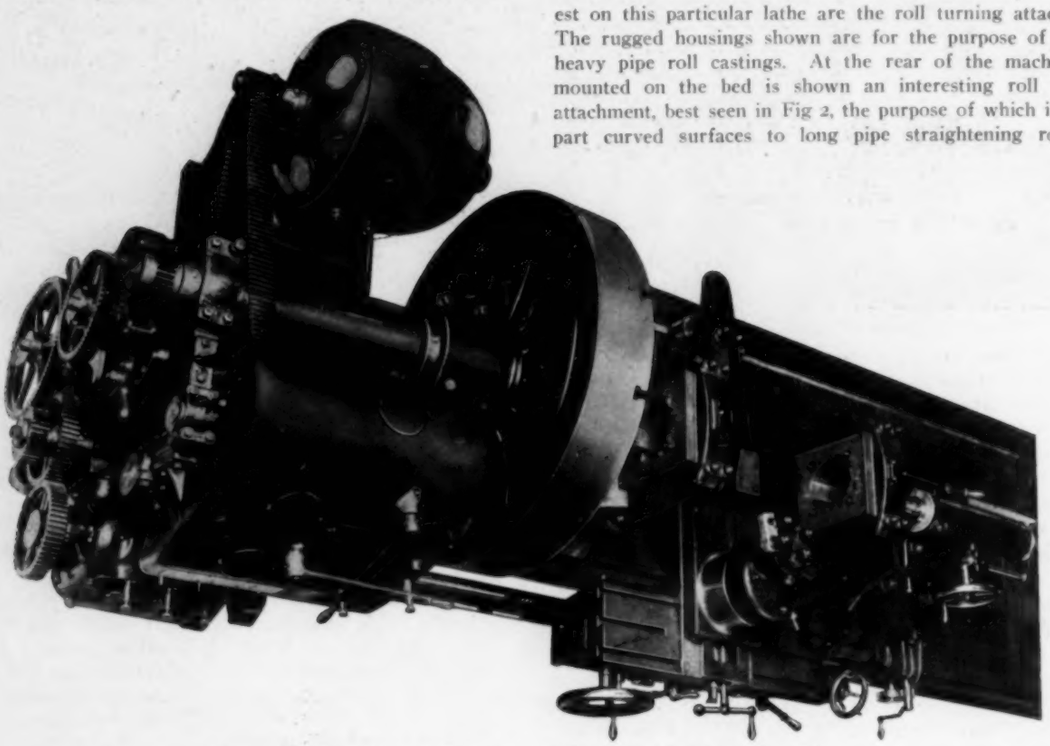


FIG. 2.—MOTOR DRIVE AND GEARING OF 60-INCH ROLL TURNING LATHE.

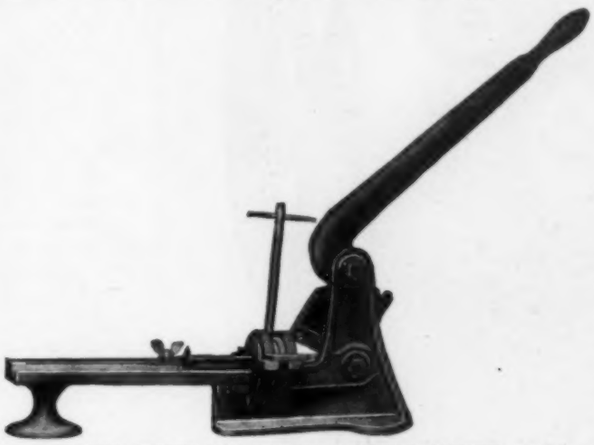
with the compound rest seen in Fig. 1, and is used for grooving out pipe welding rolls. This rest has a capacity for rolls for pipe from 2 to 20 inches diameter; a limiting gauge which is provided being of great value to the operator in setting the tool to any desired diameter. This rest operates with rotary motion, through worm and worm wheel, with either hand or power feed, the latter being derived through the feed rod and carriage with all the advantages of the regular feeds.

Otherwise the lathe contains all the features of excellence peculiar to "American" lathes, including the heavy drop V bed, making the actual swing 62 inches. All gears throughout are coarse pitch and wide face, cut from the solid.

ROD CUTTER AND CHAPLET POINTING MACHINE.

Poole's rod cutter and chaplet pointing machine is a very simple and easily operated device. The tool comprises a chuck for holding the chaplet and an adjustable gauge against which the head of the chaplet is placed. One cut is made in the first position, then the chuck and chaplet are rotated through an angle of 90 degrees and the second cut is made. This produces a very sharp point on the chaplet. There is also a sliding rod or gauge by means of which the machine can be used as a rod cutter.

This work of pointing chaplets is usually done by the blacksmith and is sometimes handled on an emery wheel, but where a foundry has many chaplets to be pointed a machine built for the purpose will effect a considerable saving. The machine here illustrated is patented and the rights in the United States are controlled by the J. D. Smith Foundry Supply Co., of Cleveland.



A ROD CUTTER AND CHAPLET POINTING MACHINE.

What is believed to be the first iron bridge ever constructed for railroad travel is now on exhibition at the Reading Co.'s yards at Reading, Pa. It was designed by Richard B. Osborne, chief engineer of the Philadelphia & Reading Railway Co., and erected in May, 1845, for a double track crossing over a small stream south of Flat Rock Tunnel, near Manayunk. The bridge remained in use until 1901, when it was taken apart and made way for a heavier structure. When the structure was completed, in 1845, there was quite a celebration when the first train ran over it. All the work on this bridge was done by hand with only such meagre facilities as were afforded by the blacksmith forge and hand tools.

The United Iron Works Co., Springfield, Mo., has declared a four percent dividend on the capital of $650,000. This company was organized a year ago by the consolidation of the Crescent Iron Works, the Sterling Iron Works, of Springfield; the Aurora Foundry & Machine Works, Aurora, Mo. and Iola, Kan., and the purchase of the Pittsburg Foundry & Machine Co., Pittsburg, Kan.

The assets of the Bromley Foundry Co., Albion, N. Y., have been sold at auction to W. T. Bromley for $1,535. It is expected that the company will pay about ten cents on the dollar.

LAKE SUPERIOR MINING INSTITUTE.

The committee having in charge the arrangements for the tenth annual meeting of the Lake Superior Mining Institute is making good progress and the following general outline can be presented at this time: Members to meet at the Curry Hotel, Ironwood, on Tuesday morning, Aug. 16, where the day will be spent in visiting the mines on the Gogebic Range. For this feature ample accommodations will be provided for the comfort of the visitors. In the evening a session will be held for the reading of papers and the transaction of such business as may come before the meeting. After the meeting the party will leave by special trains for Milwaukee, arriving there Wednesday forenoon, and proceeding immediately to the plants of the Allis-Chalmers Co., Prescott Pump Works, and such other points as may be convenient. There will be a session held in the afternoon or evening as may be decided later, for reading papers, etc., also an excursion to some of the interesting points near the city. Headquarters will be at the Plankinton House.

On Thursday there will be an excursion to the plants of the Nordberg Mfg. Co., the rolling mills, Bucyrus Works and other points of interest. In the evening a banquet will be tendered to members and their guests. Trains will leave at convenient hours after the banquet, one returning to Ironwood, Ashland and Duluth, and another to Iron Mountain, Ishpeming and the Copper Country.

Itinerary of the trip with railroad time cards and all necessary information will be furnished members upon their arrival at Ironwood. The following railroads have granted rate of one and one-third fare on the certificate plan, for the round trip to Ironwood and return: Chicago & Northwestern; Chicago, Milwaukee & St. Paul; Wisconsin Central; Duluth, South Shore & Atlantic; Minneapolis, St. Paul & Sault Ste. Marie; and the railroads from the Mesabi and Vermillion Ranges. Tickets will be sold on August 13th, 14th, 15th and 16th, good for return up to and including the 22nd. Certificates must be signed before purchasing return ticket. Following is a partial list of papers which will be presented at the meeting: Titanium and Titaniferous Iron Ores, Dr. Nelson P. Hulst; Supply System, Walter M. Jeffery; On the Bisbee District of Arizona, George A. Newett; Sinking Sand Shaft at Maas Mine, Negaunee, Mich., W. W. Graff; Iron and Steel Consumption, George H. Abeel; A Study of Faulting at the Ashland Mine, Lucien Eaton; Sinking Shaft in Quick Sand at Susquehanna Mine, Hibbing, Minn., H. B. Sturtevant.

Messrs. Graham Pope, Jas. R. Thompson, F. W. Speer, J. Parke Channing, R. S. Rose and others have kindly promised to prepare something of interest to the Institute.

The Rio Grande Western Railroad will at once ask for bids on construction for about 75 miles of road from Marysvale to Cedar City, Utah. This means the penetration of the railroad into the iron and coal deposits of Iron county, a plant it has long had in contemplation. The new road will enable the Colorado Fuel & Iron Co. to obtain ore from Utah, which is said to be much superior to the ore shipped from Wyoming and New Mexico, which is now being used by the company.

Charles M. Schwab has made an offer to the town of Loretta, Pa., the home of his early boyhood, that he will grade and pave the main street if the residents will lay brick sidewalks. He will also erect a complete water plant and keep it in operation, rent free, if the borough will lay the main, and will put in an electric plant if the citizens will pay for operating it.

D. B. Torpy, of Marietta, O., has been appointed trustee of the United Sheet & Tin Plate Co., which has been declared bankrupt, and its plants at Marietta, Byesville, Newcomerstown, Canton and Newark will be sold.

At Geneva, N. Y., the sheriff has levied upon the plant and equipment of the Vance Boiler Co., to satisfy a judgment for $15,185 obtained by the Geneva National Bank. It is expected that the company will be reorganized.

A NEW BOLT AND RIVET HEADER.

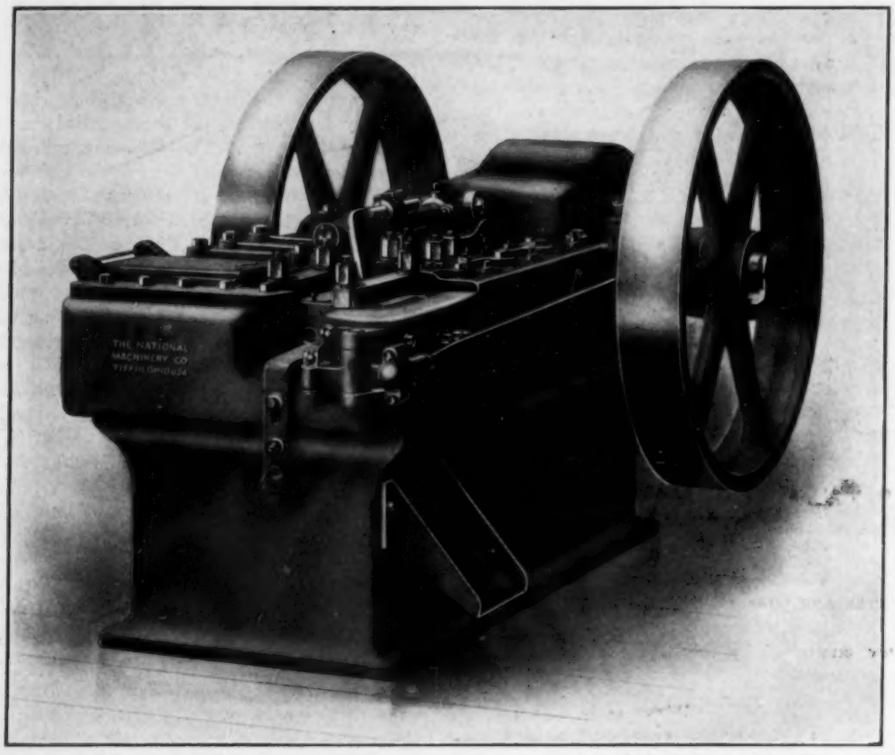
The National Machinery Co. of Tiffin, O., has designed a new line of continuous motion bolt and rivet headers. The pressing demand for high outputs at low cost has greatly increased the manufacture of bolts by the single blow process, and to meet this demand the company has developed a line of machines especially adapted to this work. In these machines the fly wheels are keyed directly to the crank shaft, and a bolt or rivet is cut off and headed at each revolution of the fly wheel. The movement of the dies is so timed, that, although they have ample gather for making all styles of bolts or rivets within their capacity, the grip dies are open as large a part of each revolution as possible, enabling the machines to be easily fed even at an unusually high speed. The short grip gives long life to the dies, and a minimum amount of power is required to operate the machine.

The machines are furnished with semisteel beds of ample length, allowing the use of long slides, thereby insuring ample wearing surfaces and correct alignment. The heading slide is driven by a crank on the main shaft, and the grip die slide is operated by a sliding wedge actuated by toggles connecting to the heading slide. Only three toggles are used and they are bushed with phosphor bronze and move on large hammered steel pins. The heading and grip slides are provided with wearing plates to prevent injury to the bed, and have adjustable liners both at the top and sides, enabling the slides to be accurately aligned. An automatic relief is provided to prevent damage to the machine in case cold work is accidentally caught between the grip dies. After the relief operates it automatically sets on the next back stroke and the operator can proceed with his work without stopping the machine. On account of the high speed at which these machines run, special attention has been given to the oiling system, and, as practically all the working parts are covered, ample protection is provided against dirt and scale.

The wedge grip affords a solid backing the full length of the grip dies, prevents them from springing out of position, and allows single blow work to be produced with the fins practically eliminated under the head. The movable grip slide is of unusual length, and, as it has bearing surfaces on both sides of the wedge slide, its alignment is accurately maintained, and all tendency to cramp removed. The action of the wedge slide, when closing the dies, tends to keep the grip slide in contact with the front of the bed, insuring contact of the shearing surfaces and the blanks are cut with good clean edges.

In the operation of these machines, on single blow work, the bar is heated to a length of four or five feet and is fed through a steel bush in the face plate, and against the movable stock gauge; next the blank is cut off by the closing action of the movable grip die, and is held securely in the groove in the dies while the heading tool moves forward and forms the head; then the dies open and a kick-out ejects the finished work. The machines are furnished either for hand or automatic feed, although the hand feed is recommended as being the most serviceable.

The machine illustrated occupies a floor space of 8 feet 6 inches x 5 feet 3 inches and weighs 15,000 lbs. net. It has large fly wheels and ample belt power, and bolts or rivets up to and including 1¼ inch diameter and 9 inches in length can be cut off and headed, one at each revolution of the machine.



A NEW BOLT AND RIVET HEADER.

If the court at Galion, O., confirms the sale of the machinery and stock of the Flickinger Wheel Co., to J. W. White, of Terre Haute, Ind., Mr. White expects to organize a company and engage in the manufacture of wheels at Galion. The sale of the property of the Model Gas Engine Co., Auburn, Ind., to Mr. White was not approved by the court.

Receiver Samuel Hunt, of the Detroit Southern Railroad, has addressed a letter to the Commercial Club of Springfield, O., stating that if the desired assistance is extended by the people of Springfield the railroad will build car shops which will cost $60,000 and will employ 700 men The shops now located at Springfield are much too small, scattered and necessarily expensive to operate.

The Garden City Fan Co., Chicago, is building for the Pekin (Ill.) plant of the Glucose Sugar Refining Co. what it states is the biggest fan ever built for induced draught work. A few of the details of this huge fan are as follows: It is designed for 5,000 h. p. boiler capacity. From the top of the housing to the bottom of the fan pit is 35 feet. It has a 9 in. shaft, and a wheel 20 feet in diameter. The length of the fan is 28 feet, while the weight of the shaft and coupling is 4,000 pounds.

OBITUARY.

George Fordyce Blake, well known as an inventor of steam pumps, brick making machines and water meters and numerous other mechanical devices, died July 22 at his home in Boston, aged 86 years. Mr. Blake's invention revolutionized the brick industry in Massachusetts, and his steam pump was such a success that it made him a very wealthy man. The George F. Blake Mfg. Co. was formed for the manufacture of Mr. Blake's inventions. Later the Knowles Pump Works, of Warren, Mass., was added to the Blake interests and a plant was built in England to supply the foreign demand more quickly. Nine years later the entire business was bought by a syndicate and is now a part of the International Pump Co. Mr. Blake retired at the time of the sale of the property.

Hiram Washington Hayden, one of the founders of the Holmes, Booth & Hayden Co., Waterbury, Conn., died suddenly at his residence in that city July 18, aged 84 years. Mr. Hayden was an inventor of ability. Among his inventions were a breach-loading rifle, a magazine rifle and other fire arms. A machine for making metal tubing was sold to a Pittsburg concern.

David J. Matlack, who for 56 years was superintendent of the iron foundry of the Cramp Shipbuilding Co., died suddenly of heart disease July 25 at his home in Langhorne, Pa. He was born in Philadelphia 73 years ago. The day of his death he had just completed the castings for the largest turbine wheel ever made, it being capable of developing 12,500 h. p. He was a member of the American Society of Mechanical Engineers.

Wallace W. Herrick, chief of the benefit and pension bureau of the American Steel & Wire Co., died at his home in Cleveland Aug 1, aged 53 years. After varied service with railroads and the government, Mr. Herrick was employed about five years ago by the American Steel & Wire Co. Previous to the consolidation of the concerns which now compose that company, different pension systems were in existence, which were abolished to make way for a new and better plan devised and perfected by Mr. Herrick. This new system proved very satisfactory and has resulted in helping many worthy men who had grown old or crippled in the discharge of their duties. The employes pay nothing into the fund, which is derived solely from money set aside every year by the company.

Abraham Dearolf, 46 years superintendent of the iron works of the Potts Bros. Co., Pottstown, Pa., died July 25, aged 65 years.

Sweet's Steel Co. Open-Hearth Plant.

The first heat of basic open-hearth steel was turned out by the Sweet's Steel Co. at its new plant at Newberry, near Williamsport, Pa., on Wednesday, July 27. The quality of the steel was all that could be desired. The company has three 12-gross ton Siemens basic open-hearth furnaces, all of which will shortly be ready for operation. George Mills is superintendent of the open-hearth department.

A Bar That Cannot be Sawed

A Pennsylvania inventor has taken out a patent on a "bar which cannot be sawed through." The most obvious use of such a bar is in prison and penitentiary construction. The bar has a number of holes formed throughout its length and these are located near the surface of the metal. The holes are filled with glass and this hard material is counted upon for the effectual discouragement of the sawyer and is certainly severe on the saw. There would be some additional expense attached to the manufacture of such bars over the common form, and the diameter would necessarily be increased to allow of sufficient stock plus the inserted glass—an increase which it would seem would be enough to deter the ordinary individual from the long and arduous task of cutting through the thick metal even without the added resistance of the glass.

Plans are being perfected by the Niagara, Lockport & Ontario Power Co. to construct at Lockport a power plant larger and more costly than any other in the Niagara region. The plans include the building of a deep canal from LaSalle on the Niagara river to Lockport where a fall of 300 feet is obtained. The financing of the company is to be provided for by the issue of bonds to the amount of $24,000,000. Owing to the fact that the head of the power company, Horace Andrews, of Cleveland, negotiated the purchase of trolley lines in Central New York for account of the New York Central Railroad Co., it is inferred that Vanderbilt interests are to be identified with the Lockport Power Co. and that by this alliance the Vanderbilt companies will obtain necessary electric power for the operation of all their lines, not only upon the Niagara frontier, and in Central New York, but eventually as far east as Albany.

American-European Trade Alliances.

Another "community of interest" bond is announced between the electrical circles of Europe and America, in the shape of an agreement between the Crocker-Wheeler Co., and Brown, Boveri & Co., of Switzerland, whereby the former undertake the exploitation of the latter's alternating-current designs and inventions in this country. To the electrical fraternity it means a notable enlargement of the American alternating-current industry, hitherto concentrated in few hands. Good results in the way of even more rapid and more liberal development of this field than has already taken place may be naturally expected. But perhaps this is only of secondary interest. Primarily, the new affiliation takes rank with the other international alliances formed in the past year—notably that of the Allis-Chalmers Co. with Escher, Wyss & Co., and with the European steam-turbine interests—as an indication that the various countries are coming into closer industrial co-operation. International pooling of brains, by more effective means than were hitherto used, is recognized as advantageous. The exchange of ideas through the technical press, or by means of competitive imitation of designs, or by the "Studienreisen" so popular just at present in Germany, is slow and not always fruitful. On the other hand, direct commercial invasion of one country by another has numerous weak features. One of these is illustrated by another recent announcement: that the German branch of an important American manufacturing concern has in a few years sustained losses aggregating half its entire capital stock. But a co-operative combination which contemplates merely the pooling of ideas and designs of two concerns, each prosperous and successful in its own country, ought certainly to result in mutual benefit.—[Engineering News.

There is more foundation for the reports of oil developments on property of the Republic Iron & Steel Co. in the Indiana gas fields than for most of the Wall Street statements concerning iron and steel companies. There is already a good income from the Republic company's oil wells in Indiana and it has leases and rights on about 20,000 acres. It is the intention to carry on thorough exploration and development operations.

The Winder Foundry & Machine Works, at Winder, Ga., was not destroyed by a cyclone as recently reported. It is running on full time and having an excellent business. The damage done by the storm was confined to a warehouse, which was blown down.

Furnace A of the National Tube Co., McKeesport, Pa., was blown in last week after a brief idleness. This stack has been out for relining and an automatic skip hoist was also installed. Miss Helen Worcester, daughter of Edward Worcester, first vice president of the company, applied the torch.

James Stewart & Co., Pittsburg, have been awarded the contract for the erection of a new plant for the Singer Mfg. Co., at St. John's, Quebec. The plant will comprise 22 fireproof buildings and will cover a site of 20 acres. The machine shop will be 850 feet long and six stories high.

John F. Allen, 370-372 Gerard avenue, New York, manufacturer of the Allen riveting machines, has signed a five-years' contract with Fenwick Freres & Co., 21 Rue Martel, Paris, whereby they are to have the control of the Allen tools in France, Italy, Spain, Portugal and Belgium. They intend to carry the Allen machines in stock in their various branch houses.

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AUGUST 4, 1904

STEEL CORPORATION EARNINGS.

Those who are perfectly familiar, through connection with large steel manufacturing enterprises, with actual occurrences in the trade during the past half year, have shown such a disposition to question the validity of the United States Steel Corporation's report of six and one-quarter millions more earnings in the second quarter than in the first quarter of this year that a careful gathering together of data which have been presented to the public appears called for, with an analysis of their bearing upon the present condition and prospects of the corporation.

The table below presents the quarterly "net earnings" of the corporation. These "net earnings" are arrived at after bond interest and fixed charges of subsidiary companies have been met, but before any payments or sinking fund allowances have been made against such subsidiary bonds. The propriety, from an expert accountant's standpoint, of such a splitting up of the obligations arising from the existence of such bond issues need not be discussed at this time.

Steel Corporation "Net Earnings" by Quarters.

	1901.	1902.	1903.	1904.
First	.....	$26,715,458	$25,068,707	$13,208,886
Second	$26,363,841	37,662,058	36,642,309	19,490,725
Third	28,663,843	36,945,489	32,422,955	.....
Fourth	29,759,912	31,985,759	15,037,181	.....
	*$84,787,596	$133,308,764	$109,171,152	†$32,699,611

*Nine months.
†Six months.

The two previous second quarters did not show as great a proportionate increase over their preceding quarters as did the second quarter of this year. Moreover, a considerable part of the earnings reported for the second and third quarters of years prior to the present was due to the profits figured upon iron ore as it was mined and shipped, such profits approximating a dollar a ton and amounting to between $6,000,000 and $8,000,000 per quarter. This year second quarter earnings were contributed to in no such way, for the double reason that production and shipments were extremely light, while the announced change in bookkeeping methods would have precluded the claiming of profits on ore until it was manufactured into products which had passed out of control of the organization.

In the earlier portion of the quarter the corporation was partly engaged in the manufacture of semi and finished products from pig iron purchased at a price several dollars a ton above the figure for which it could itself have made it. This procedure, adopted in an unsuccessful effort to accomplish results ulterior to the earning of current profits, explains no part of the increase which is under scrutiny. Towards the latter part of the quarter the corporation made a considerable tonnage of pig iron and a smaller tonnage of some more finished products which were being carried on July 1, but again the profits ultimately probable on such manufacture could not figure in the earning statement because the products had not passed beyond corporation control.

This inquiry could be pursued in still further detail without disclosing sufficient grounds for the increase in earnings which has been reported. One favorable instance of importance would be found, and that is that on April 1 the corporation had large stocks of tin plate which were disposed of during the quarter. The stocks had been estimated at as high as 3,000,000 boxes, by some authorities, towards the close of the first quarter. This estimate was probably excessive, and at any rate the stocks had begun to decrease during March, so that the profits realized on such stocks during the second quarter could hardly have exceeded $1,500,000. Indeed, they could hardly have been so large, in view of the fact that the sum charged off for depreciation in inventory at the close of 1903 could not have included all profits involved in materials which subsequently made part of this tin plate.

The willing presentation of annual and quarterly reports by the steel corporation certainly authorizes a frank and rigid analysis of them by comparative or other methods. The "depreciation and extinguishment funds" and "extraordinary replacement funds" which are contributed to monthly and quarterly, and do not include the special funds of $10,000,000 each provided at the end of each of the past two years, have together been approximately as follows per quarter since the beginning of 1902:

	1902.	1903.	1904.
First	$3,050,000	$3,000,000	$1,717,778
Second	4,000,000	3,900,000	3,059,062
Third	4,000,000	3,900,000	.....
Fourth	3,100,000	3,900,000	.....

The allowance for the first quarter of this year is but 57 percent of the average of the two previous corresponding quarters. The enormous shrinkage can hardly be justified on the ground that production was decreased. The most prominent feature of the decrease was the blowing out of nearly all the blast furnaces and their subsequent starting, which certainly did not contribute to decrease the depreciation against them.

The second quarter allowance is much more satisfactory, the decrease from previous corresponding quarters being partly explainable on the ground that little ore was mined in the second quarter of this year. The change in methods of returning profits, as already referred to, must not of course reduce the ultimate de-

preciation and extinguishment charges on account of ore exhaustion.

When, however, the validity of the second quarter's earnings is questioned, the possible liberality of depreciation deductions from them is no ground for commendation.

On still another point a scrutiny of the corporation's statements for the public makes room for some comment. Out of net earnings as currently reported the principal of the various bonds of subsidiary companies must be paid, either directly as the various issues fall due, or by the creation of sinking funds. The total of such issues, still in the hands of the public, is now approximately $100,000,000, divided among over forty different issues. In a few cases a proportion must be retired annually, while in most instances the whole issue must be retired at maturity, the indenture requiring no sinking fund. Now it has happened that through fairly liberal appropriations in the past two fiscal years, when earnings were large, there was left in the fund against subsidiary companies' bonds on Dec. 31, 1903, the sum of $490,096, in cash, while only $269,000 of bonds matured in the first half of this year and $210,000 will mature in the second half. The Union-Sharon bonds alone require a sinking fund, amounting to about $800,000 annually. On account of the cash with which the year was started, and the small amount of bonds maturing this year, it has been possible to scale down the appropriations for subsidiary company bond retirement to $227,867 in the first quarter of this year and $469,425 in the second quarter, a total of $697,292, against a total absolute requirment of $669,000, made up of $269,000 of bonds falling due, and $400,000 sinking fund against the Union-Sharon issue.

It is therefore simply a case of "pay as you go" in the matter of these bonds. In 1905 there will fall due $729,000 of subsidiary bonds, and in 1906 $830,000, while in some subsequent years the amounts will be still greater. Confining attention to the next two years, however, the allowances, including the Union-Sharon singing fund, and disregarding the probability of Clairton requiring some attention, will have to average about $1,580,000 annually, or more than the average allowance of the last six months, and greatly in excess of the first quarter reservation, while in some subsequent years the allowances will have to be much greater.

In the first half of the present year, with the aid of the decrease in depreciation charges and the scant allowance for subsidiary bond retirement, the corporation statement has made it appear that the deficit of the first quarter, after paying the preferred dividend, was wiped out by a surplus in the second quarter, leaving the surplus for the half year $920,524—a figure that cannot bear the favorable construction put upon it in certain quarters, when checked up by facts which some reviewers insist on ignoring.

The ability of the corporation to make large earnings when the iron trade is prosperous has been well demonstrated; and there is no reason to doubt that such times will come again. When they do come we shall look to see the adoption of the policy of a very liberal carrying of earnings into surplus so that the lean periods may not put such a strain upon the accounting department as has been in evidence lately. Had a conservative policy in the matter of dividends prevailed in the past three years the present difficulties attending the publishing of financial statements would have been diminished.

A YEAR'S FOREIGN TRADE IN IRON AND STEEL.

The steady increase of exports of iron and steel and the decline of imports are shown in the government report for the year ending with June, 1904. Exports of which the tonnage is reported have grown from 302,492 gross tons in 1903 to 675,529 tons in 1904. The most important items are steel rails and crude steel, the export movement being confined to a large extent to the past six months. The following table shows our exports by months of pig iron, steel and steel rails:

EXPORTS IN 1904, GROSS TONS.

	Pig Iron.	Steel.	Rails.
January	6,742	1,860	1,740
February	3,429	26,205	8,465
March	3,954	36,908	17,873
April	2,898	28,276	10,460
May	2,031	31,527	41,388
June	2,659	32,068	51,101
Total	21,713	156,844	131,027

The detailed exports of which the tonnage is reported are as follows:

EXPORTS OF IRON AND STEEL FROM THE UNITED STATES—GROSS TONS.

	June		12 mos. end'g June	
	1903	1904	1903	1904
Pig iron	1,653	2,659	18,198	34,635
Scrap	600	2,206	6,043	16,845
Bar iron	2,580	2,544	18,117	22,869
Wire rods	3,148	2,362	21,834	15,780
Steel bars (not wire rods)	659	3,702	12,990	21,446
Iron rails	...	196	81	1,513
Steel rails	842	51,101	22,896	160,894
Billets, ingots and blooms	30	32,088	2,127	176,961
Hoop, band and scroll iron	142	265	1,669	2,838
Iron sheets and plates	226	722	2,879	5,931
Steel sheets and plates	1,116	1,984	14,144	19,150
Tin plates, terne plates and taggers' tin	2	542	682	3,623
Structural material	3,093	5,874	32,952	35,892
Wire	9,106	9,384	100,121	113,782
Cut nails	799	963	7,168	9,588
Wire nails	2,081	2,345	28,109	32,431
Other nails, including tacks	709	261	2,481	2,554
Total	26,286	119,178	302,492	675,329

The exports of ore were 5,370 tons in June, 1904, against 1,100 tons in June, 1903. The value of exports, excluding ore, but including machinery and other items of which the tonnage is not returned was $10,507,097 last June as compared with $8,472,942 in the preceding June. For the year, the values were $111,948,586 in 1904 and $96,642,467 in 1903.

The imports of which tonnage is reported declined from 1,723,251 tons in 1903 to 502,250 tons in 1904. Comparing the twelve months ending June, 1903, with the twelve months ending June, 1904, we have the following:

IMPORTS OF PIG IRON AND CRUDE STEEL—GROSS TONS.

	Pig Iron.		Steel.	
	1902-3.	1903-4.	1902-3.	1903-4.
July	62,166	38,046	37,168	33,083
August	79,447	40,475	39,027	20,380
September	82,196	16,414	27,726	13,530
October	64,204	18,704	32,036	10,343
November	100,400	18,765	41,077	6,580
December	115,373	14,719	26,230	1,425
January	110,650	10,812	38,691	1,860
February	45,187	3,841	20,151	1,514
March	59,628	12,400	31,464	1,146
April	99,944	7,713	29,014	879
May	57,139	5,184	26,389	547
June	79,874	4,062	30,503	637
Total	956,198	191,135	379,476	91,922

The tonnage table of imports on articles named follows:

IMPORTS OF IRON AND STEEL TO THE UNITED STATES—GROSS TONS.

	June		12 mos. ending June	
	1903	1904	1903	1904
Pig iron	79,874	4,062	956,198	191,135
Scrap	17,634	2,358	135 901	28,614
Bar iron	4,239	2,699	43,167	80,756
Iron and steel rails	11,026	6,808	122,994	53,358
Hoop, band or scroll	155	17	1,562	1,829
Steel ingots, slabs, billets or bars	30,503	637	379,476	91,922
Sheets and plates	1,052	223	8,063	10,198
Tin and terne plates	3,871	6,674	49,068	56,656
Wire rods	1,964	1,697	22,990	18,519
Wire and wire articles	384	210	3,832	4,953
Structural shapes*	.....	706	.....	14,310
Total	150,702	26,091	1,723,251	502,250

*Not reported separately prior to July 1, 1903.

The total value of imports of iron and steel, excluding ore, but including a number of lines in which tonnage is not ascertainable, was $2,030,798 in June against $1,920,334 in May and $4,604,777 in June of last year. The values for the year were: $27,028,436 in 1904 and $51,617,312 in 1903.

The Labor Situation.

NATIONAL METAL TRADES ASSOCIATION NOTES.

At St. Louis during the past week there has been a decided increase in the calls for help. The vacancies include all-round mechanics, lathe, boring mill, planer, punch and vise hands, handy men, solderers and blacksmith's helpers. These places were promptly filled by the St. Louis Metal Trades Association.

On July 26 a strike was declared by the polishers and buffers employed in the shops of Degge & Musick, St. Louis. Eight of the eleven vacancies have already been filled with men exceptionally good in this line of work. One of the new men was assaulted by a striker last week. The assailant is known and will be prosecuted as soon as located. The strike is broken so far as the association is concerned.

The labor bureau of the Pittsburg Manufacturers' Association for the week ending July 29 reports the employment of sixteen skilled laborers while twenty-one were discharged. There were seventeen applications for work and four calls for help were received. Conditions are unchanged and all is quiet.

In New York, with the exception of those of the Burlee Dry Dock Co. and the W. A. Fletcher Co., the shops of the members of the association are running under normal conditions. Union and non-union boilermakers are working harmoniously together, and the long established custom requiring four boiler makers on a gang outside of the shop has been abolished and boiler makers are being distributed into gangs as employers may determine.

At a special meeting of the New York Metal Trades Association on July 28 to consider the strike, several subjects of interest were discussed, including that of overtime. A resolution was passed referring the subject to the executive committee for its consideration, with instructions to report its recommendations on Aug. 1.

At the convention of the American Federation of Labor, held in Boston last spring, the subject of jurisdiction of work between boiler makers and structural iron workers was referred to the executive committee of the A. F. L. for report, both organizations agreeing to abide by the decision rendered. The executive committee has made the following awards: First, smoke stacks are awarded to the Brotherhood of Boiler Makers and Iron Ship Builders of America. Second, Gas meters, steam, air, gas or water-tight work with the frame work to the coping of the outer tank is awarded the boiler makers, and the guide from work above the coping of the outer tank is awarded to the International Association of Bridge and Structural Iron Workers. Third, erection of girder and angle iron work in connection with coal hoppers and ash chutes in buildings is awarded the structural workers. Fourth, assembling and erection of the frame and plates on safety deposit vaults is awarded the structural men.

Mr. John Kirby, president of the Dayton, O., Employers' Association, said in a speech before the National Association of Manufacturers: "Those who have given much thought to the labor question will, I think, be inclined to agree with me when I say there is no greater problem before the employing interests, before the substantial law abiding citizenship of this country, than that of coping with the grave issues raised by the strike leaders and the demagogues of anarchy and socialism."

In Worcester, Mass., some progress has been made in the molders' strike and the foundries are running with a force equal to necessities for taking care of their work. Orders are being filled promptly, and there seems to be little trouble with the pickets.

The Walsh & Weidener Co., Chattanooga, Tenn., reports that its open-shop method of conducting its business has been acknowledged by the union and the strike declared off.

W. P. Eagan, the new N. M. T. A. commissioner, has gone to Quincy, Ill., to look after the interests of the Quincy Engine Works.

E. F. DuBrul, the ex-commissioner of the N. M. T. A., visited the temporary offices at Chicago Monday en route to the Catoctin group of mines near Prescott, Ariz., in which he is interested.

Commissioner Wuest says that judged from the number of congratulatory letters received from the Chicago members, the association has achieved an enviable reputation in that city for the work it has accomplished in connection with the strike of machinists. The men that have been brought to take the strikers' places have sent for their families, and Commissioner Wuest reports the tone of the trade materially lifted by the efficient class of men now working in the shops of its members.

Commissioner O. P. Briggs, of the National Founders' Association, was a caller at the temporary offices of the N. M. T. A. in Chicago en route to Minneapolis.

Daniel Davenport, one of the executive officers of the American Anti-Boycott Association, is making temporary headquarters in Chicago, for the purpose of better protecting the interests of several members of that association in connection with the stock yards strike.

LABOR NOTES.

At a meeting of the Citizens' Alliance, Memphis, Tenn., the action of the officers of the Machinists' Union in attempting to dictate and control the management of the business of the Livermore Foundry & Machine Co., was strongly condemned. A reward of $1,000 is offered for the arrest and conviction of the man who attempted to destroy the plant, and an additional $250 for the men who made an assault upon a non-union workman.

Strikers in the foundries at Utica, N. Y., finding that they could not win their strike by lawful means, started rioting tactics. Non-union molders were attacked as they were leaving the shops of the International Heater Co. and three non-union men were seriously injured. As a result of repeated disturbances, an application for an injunction restraining the union from further interfering with the workmen was made and granted. All the Utica foundries have as many molders as they desire; in fact, they now have more molders at work than they had previous to the strike.

As a result of a controversy with its machinists about a piece of work brought into the shops from the Memphis Machine Works, the Livermore Foundry & Machine Co. has declared its machine shop an open one. The company had always employed union men and will do so in the future but non-union men will also be employed.

Judge Dunwell, of Lyons, N. Y., some time ago granted an injunction restraining striking machinists from intimidating employes of the W. P. Davis Machine Co. Notwithstanding this injunction, William C. Mount, a walking delegate, went to a boarding house where non-union men had been boarding and threatened to wreck the building and business if the boarding house woman continued to take in non-union boarders. For this act Mount was fined $100 for contempt of court, on the ground that his threats were an act of coercion.

Benjamin Davis, an attorney of Birmingham, Ala., has been named by the Amalgamated Association as its representative on the board of conciliation to adjust the bar iron wage scale. This is the third appointment made by the association. As yet no third representative of the board has been named. No date for a meeting of the board has yet been set.

SEPARATE ORDER COSTS.

BY R. W. MACDOWELL.

Some months ago the writer was called upon to devise a plan for a small foundry, whereby they could figure out the separate cost of each order they got out. Their previous efforts in this line had been rather unsuccessful, chiefly owing to the difficulty they had experienced in finding just how much labor had been expended on each order. The foundry in question made a general line of castings, running particularly to such work as coke oven door frames, grate bars, frogs and turnouts and such other castings as are commonly used around a coke plant. Their patterns were bought from outside sources and and did not enter into their manufacturing costs proper.

The orders were, of course, begun and finished at different times, and it was manifestly impossible to keep all the men at work on one order at the same time. If this could have been done it would have been a comparatively easy matter to have kept record of the total time expended between the start of an order and its completion, charging all such time to this order. But this being out of the question, it became necessary to obtain a method by which the time spent by each molder on the various orders could be definitely determined, after which the expense of cleaning and non-productive labor could be pro-rated to the amount of the productive labor, thus getting at the actual cost of the work very closely. The amount and cost of the material was, of course, known, so it was not difficult to figure the total cost of the order after the cost of the labor was known. It is a very hard proposition, and is not advisable to attempt to compel the molder to keep record of his work, as the average molder wants no bookkeeping that can be possibly avoided, and any records gotten from him are not, as a rule, to be depended upon. So the principal requisite was to find some way of getting the required information without in any way depending on the molder to furnish it. This was welcomed by the men, who had previously been expected to fill out sundry blanks giving their time on various orders, with a description of their work.

The first step necessary was to finish up as many of the orders on hand as possible, so as to have as many men at work on one order as could conveniently be employed on it, thus keeping down the number of separate orders in the foundry at one time. The next thing was to arrange a production sheet which would show not only the number of castings made each day, with their weight, but also the time of each man, the order he worked on, and the total time on each order for the day. This was made up as shown in Form. 1.

Production for Thursday, Jany 7th 1904

No.	Names	Articles	Marks	Order Number	Number Up	Number Duct.	Number Good	Weight Each	Weight Up	Weight Duct.	Weight Good	Price Each	Amount per Man	Ck.	Amount per Order
8	J. Rennard	Grate Bar	C 9	389	9	1	8	120	1080	120	960	18	2 16	✓	2 16
14	Myers	Floor Plate	R 16	386	20		20	80	1600		1600	18	2 90		
13	Wyard	" "	R 16	"	34	1	33	80	2720	80	2640	18	4 68		
6	Johnson (Tulper)												1 08		
16	Co Malley "	" "	R 16	"	38	2	36	80	3040	160	2880	18	1 62		
29	Wilson "												1 80	✓	10 62
18	Jones	Screen Plate	M 19	397	21		21	50	1050		1050		2 00		
17	Hanson	" "	" 14	"	19		19	50	950		950		2 00		
22	Ray	Wicket	" 18	"	4		4	415	1660		1660		2 25		
36	Miller	"	" 18	"	9		9	415	1245		1245		8 00	✓	9 25
15	Conner	Grate Bar	K 19	390	10	1	9	120	1200	120	1080	20	2 70		
"	"	" "	K 18	"	12		12	100	1200		1200	20	1 60	✓	4 20
11	Furman "												2 75		
28	Hayes	Coke Door Frame	G 408	395	5		5	580	1900		1900		2 75	✓	5 50
4	Norton	"	G 408	"	6	1	5	580	2320	380	1900				
					181	6	175		19925	1260	19045		50 88		50 88
					181		181		19925		19045				

FORM 1.—PRODUCTION RECORD.

The men's names and numbers are entered in their proper columns on the left of the sheet, followed by a description of the work they put up for that day. This information is obtained from the foreman's report, Form 4, which is made up and handed in each day. The order numbers are filled in by the time-keeper, who finishes up the production sheet after the work comes out of the cleaning room.

After the production sheet has been filled out, the costs of molding and material on each order are entered on the cost sheet, illustrated in Form 2. The weight of the castings is figured at a certain price per pound and entered in the "weight" column of the order. This price per pound should be figured on the iron delivered to the molder and can be arrived at by figuring the cost of all iron, coke, limestone, cupola labor, etc., for a certain period and then taking the average cost.

In the illustrations it is figured at 1 cent per pound for the

MONTH January 1904

	386		388		389		390		393		394		395		396		397	
DATE	WT.	LABOR.	WT.	LABOR.	WT.	LABOR.	WT.	LABOR.	WT.	LABOR.	WT.	LABOR.	WT.	LABOR.	WT.	LABOR.	WT.	LABOR.
Forward	329 60	47 44	42 30	4 75	54 00	11 25	40 60	9 85	270 00	37 78	10 80	3 50	22 80	2 75	110 60	21 80		
1																		
2	15 20	2 28	10 04	1 80	12 00	2 25	13 20	2 20	24 40	3 18	10 80	3 56	22 80	2 75	18 90	2 18		
	30 40	4 56																
4	30 40	4 56	12 18	1 80	10 80	2 25	24 00	2 80	22 80	3 01	10 80	2 75	19 00	2 75	19 --	2 27	39 05	4 25
			60 58	8 38	12 00	2 25	29 20	3 00		44 15					148 70	26 21		
5	45 60	6 84			9 60	2 25	29 20	3 00			10 80	2 75	19 00	2 75			26 10	4 00
6	30 40	4 56			9 60	2 25	13 20	2 20			10 80	2 75	22 80				26 10	4 25
											54 00	15 37	18 20	3 75				
7	7 20	9 18			9 60	2 25	22 80	4 20					38 00	5 50			49 05	8 25
	552 80	81 42																

FORM 2.—COST SHEET.

sake of convenience. The cost of molders' and helpers' labor on the order is entered in the same way in the "labor" column of that order. As the various amounts of material and labor costs are entered, they are indicated by a check mark in the "Ck" column of the production sheet, in very much the same way as would be done in posting to a ledger from a journal.

Each order should occupy but one space on the production sheet, or in other words the men working on this order should have all their names placed together, so as to facilitate posting

to the cost sheet. In a foundry doing a business of the size of the one for which this system was devised, there are seldom more than six orders being gotten out at once, so if the names are kept together on the sheet, it takes but a short time to make up the cost sheet each day.

As each new order comes in, its number is entered at the top of the first unused column that appears to the right of the cost sheet, and when work on it begins in the foundry the time and material costs are entered from the start. In the case of castings made for shop use, requisitions are made out, and they are treated in the same way as a customer's order. There are very few castings of this class needed at the shop where this system is in operation, so a case of this kind seldom occurs.

After the posting from the production sheet is completed, the figures are proved by adding up the labor and weights for the day as they appear on the cost sheet and comparing them with the original.

When an order is received, it is entered on an order blank like Form 3. This is the ordinary order form, being made out in copies for the office, customer's acknowledgment, foundry foremen, shipper, and any other departments necessary. It can be conveniently arranged to work with a book typewriter, in which case the work of entering an order can be done more easily and speedily. The office copy which is shown here is

Office Copy.
THE M. FOUNDRY CO.,

Sold to J. V. Wise & Co. Pa. Dec. 10, 1903
Address Phila. Order No. 386
Ship to G. C. Co. Their No. A 429
At Phila. F. O. B. Works
Terms 30 days net.
Shipment to begin Dec. 22nd 1903. Shipment to be complete Jan. 15, 1904

Marks	Articles	Number	Pat. No.	Wt. Ea.	Est. Wt.	Act. Wt.	Price	Total
G. 114	Floor Plates	690	R. 16	80	55200	55200	.018	993 60

Cost				
Iron	552	80		
Misc.	16	46		
Cost Matl.	569	26	569	26
Moulding	81	42		
Foundry	6	00		
Cleaning	27	64		
Non Pro.	13	16		
Cost Labor	128	22	128	22
Total Cost			697	48
Per lb.				0127

FORM 3.—ORDER BLANK.

made longer than the other forms, and provides a space for entering the cost. The acknowledgment and department orders are made to extend to the edge of the "total" column, and short carbon sheets can be used so the prices will not appear on the latter.

As soon as an order is completed, its column on the cost sheet is footed up and the amounts transferred to the cost division of the order. Order No. 386 is shown here. It was received on Dec. 10, 1903, from J. V. Wise & Co., to be shipped to the G. C. Co., and is entered in the usual way. Each day the material and time on it are posted to the cost sheet, and on Jan. 7 it was completed. The "386" column is footed up and the amounts of material and labor posted to their respective places on the order. As each order is completed, the same thing is done, new order numbers taking the places of the completed ones until the cost sheet is filled up.

The cost of other material than iron is gotten from the foundry report and added to the cost of iron, giving a cost of material of $529.26. The cost of cleaning the castings is gotten by counting the average cost per pound for a certain period. In a foundry where this department is on piece work the exact cost could be figured, but this method gives the cost very closely. The non-productive labor is then added, making the entire cost of labor as $128.22, and the total cost of the order as $657.48. The cost per pound is .0127. If a system of daily cost is run, this affords an opportunity for comparison by getting the order costs for a certain period, say a month, and then comparing them with the daily cost for the same length of time. It depends largely on the business as to whether both methods are necessary, and in the present instance it is not done.

The order having now been finished and the cost computed, it is filed in a binder marked "Completed Orders" and remains as a permanent record. It is thus an easy matter to refer to any order, with its cost, without trouble, both being on the same sheet.

This system can be applied to any foundry doing a moderate sized business, and is convenient and practical in every respect.

Steel Corporation Buys Trenton Iron Co.

The United States Steel Corporation has bought the wire plant of the Trenton Iron Co., Trenton, N. J., and paid for it with second mortgage 5 percent bonds. It is understood that the amount paid was $480,000. The company was organized in 1847 and its original incorporators were: Peter Cooper, James Hall, Edward Cooper and Abram S. Hewitt. Authorized capital stock was $2,000,000, of which $600,000 have been issued. The purchase was made by the Steel Corporation for the American Steel & Wire Co., which will operate the plant. The American Bridge Co., which is also a subsidiary company of the Steel Corporation, has for some time owned the structural steel plant, the bolt and nut works, the rolling mills and steel works formerly operated by the New Jersey Steel & Iron Co., of Trenton.

Wilkoff Bros., of Youngstown, have disposed of practically all their stock in the Independent Rolling Mill Co., of Cuyahoga Falls, O., to an Akron purchaser, whose name is not announced. The company is not ready to make a statement concerning its plans.

EXPORTS OF HIGH PHOSPHORUS ORES.

A correspondent of the *Engineering and Mining Journal* writes as follows concerning recent shipments of iron ore by Witherbee, Sherman & Co., to Germany and Scotland, more largely to the former country:

"It seems probable that these particular exports are not a result of dullness here and activity abroad—as might be inferred by some—but are rather due to special qualities of the ore itself. Business in the iron trade is better in Europe just now than it is on this side of the ocean, but there is still plenty of iron ore to be had in Germany and Great Britain; while both countries have the mines of Spain and Sweden to draw upon. The Lake Champlain ore is probably sold abroad at this time, because it furnishes, with some German ores, a mixture specially desirable in making basic iron. I am not familiar with the circumstances of this special contract; but make this inference from some knowledge of the ores which are being exported. For this reason, they would bring a higher price and thus make the transaction profitable.

"Under ordinary circumstances, the distance which most of out iron ores would have to be carried to reach tidewater, and the amount to be paid for ocean freight act as a substantial barrier against exports. Thus it would not be possible to send Lake Superior ores to Europe and get a paying price for them. There would be nothing left for the producer. There has been, at different times, talk of exporting Alabama ores; but investigation showed that there would be no profit in such transactions. It is not at all likely that the export movement will extendt beyond the shipments from Port Henry, which are now being made.

"It seems to me that this practical prohibition of iron ore exports is not a bad thing. The freights—both land and ocean—form really an export tax, and thus prevent any extensive movement of the kind. Such shipments are not really to be desired. It is not well for any nation to send its raw material abroad. Exports of finished products form the business really profitable. In that case the money which it costs to convert ore into iron, iron into steel, and steel into finished shapes, is spent here, to the benefit of many people. A considerable capital is retained here, instead of going abroad. It is of no use, however, to extend this discussion on a point on which there is little difference of opinion. I think all will agree that it is better for a country to work up its raw materials at home.

"At the same time, I do not think the shipments of Port Henry ores are important, or that they indicate a larger movement. They constitute a special transaction, standing by itself, and not likely to be repeated, except for special reasons."

Iron Pyrites Wanted in Germany.

Frank H. Mason, United States consul general at Berlin, Germany, writes as follows concerning iron pyrites. The control of domestic deposits of pyrites by acid-manufacturing concerns makes such exports as he suggests unlikely:

"In consequence of the diminishing supply of sulphur-containing minerals from Spain and Portugal, from which source the important German manufacturers of sulphuric acid have hitherto been mainly supplied, there is now an active demand in this country for iron pyrites and other cheap sulphide minerals which are adapted to treatment by the standard methods of making sulphuric acid. It is reported, more or less vaguely, in the American press that important deposits of iron pyrites have been recently discovered in the United States, but nothing definite is known here as to the location and extent of such deposits, what stage of development they have reached, whether there is yet an available supply of pyrite for export, and if so, at what price and under what conditions of freight and delivery. Owners of pyrite mines in the United States who are prepared to export their product in considerable quantities will receive direct information concerning connections in Germany if they will send to this consulate a statement of their output and facilities, with a small sample of their mineral and such information concerning prices and methods of shipment as would naturally interest a German importer."

Foreman's Report for Jan. 7 1904

No.	Name	Article	Marks	No. Up	Rate		
8	J. Reard	Grate Bar	B 9	9			
14	Myers	Floor Plate	R 16	20			
13	Ward	"	"	34			
6	Johnson	Helper					
16	O'Malley	Floor Plate	"	38			
29	Wilson	Helper					
18	Jones	Screen Plates	M 14	21			
17	Hanson	" "	" 14	19			
22	Ray	Weights	" 18	4			
26	Miles	"	" 18	3			
15	Conner	Grate Bar	H 19	10			
	"	"	" 18	12			
11	German	Helper					
23	Hayes	Coke Oven Frames	F 408	5			
4	Reuton	"	"	6			

FORM 4.—FOREMAN'S REPORT.

The Eastern Machinery Market.

OFFICE OF *The Iron Trade Review*,
ROOM 1315, No. 150 NASSAU ST., Aug. 2.

General conditions in the machinery market in this vicinity showed little change in July by comparison with June. In the matter of large propositions closed, especially for machine tools and power equipment, the month was notable, but these did not have any direct bearing on the situation as a whole, because contracts awarded were taken by the largest concerns. But when it comes to an improvement in which every branch of the trade shared, and in which the general run of machinery merchants were represented, the month can be said to have differed but little from June.

If machine tool men have been correct in their contention all along, that just as soon as the railroads begin to buy, a general improvement in business all along the line can be expected, the developments of the past few weeks are certainly encouraging. Not in some time have railroads been such large buyers as recently, and never have railroad machine tool projects occasioned so much gossip. Local machine tool men have been paying many visits to Philadelphia recently, where Montgomery Smith is attending to specifications recently issued by the Pennsylvania railroad calling for the purchase of machinery, which some think will eventually mean an outlay of $1,000,000. The company is maintaining the greatest reticence as to when purchases will be made, and where the tools are going to be installed. Opinion here is that the purchases will be made from time to time, which is the way many large propositions have gone during the past year, and that most of the tools will be placed in new shops.

The Erie road has not yet purchased the $150,000 worth of tools for which it is in the market. Assistant Manager Williams, of this city, who has the matter in charge, is now on a tour of inspection, and will not be back for a week or so.

Of contracts awarded, the most important includes $150,000 worth of tools, which went to Manning, Maxwell & Moore. Hides-Bement-Pond Co. got the contract for the machine tools wanted by the St. Louis & San Francisco Railroad, amounting to about $95,000, and the tools for the Pere Marquette railroad, aggregating $75,000.

As regards small orders for machine tools, the month brought about a normal business. It is this kind of trade which is mostly sought, but just now it is not very plentiful. Inquiries, however, continue to increase numerically, but a tendency to defer giving out orders is noticed. Machine tool men do not expect any improvement of a substantial character until September or October, the general belief being that August, being the favorite vacation period of the year, will offer no business of any consequence. There are reports circulating in the machinery district that the General Electric Co. will soon be in the market for an attractive list of machine tools, but definite information is not obtainable.

In engines and boilers a very quiet situation has prevailed. Your correspondent saw several representative men in these lines, and with all of them business was slower in July than for June. They reported that there was more business in sight than at any time since the present year opened, but a decided reluctancy to placing orders was found everywhere. They attributed it to the depressed condition of general business, and say that just as soon as there are any signs of awakening, there will be enough orders going the rounds to make up for the present dullness.

There is still much heard about the cutting of prices, and the representative here of a well-known Western engine concern said he had been forced to quote prices on estimates considerably below those he was naming a year ago. Orders for engines given out during the past month rarely went above 500 h. p., while the general run of orders was made up of from 100 to 300 h. p. In boilers small units still have the call, but there is no business to speak of. Estimates are now being furnished on several large items, and some contracts are likely to be placed during the next few weeks.

Electrical machinery manufacturers report business to have been about the same as June. Some houses say trade with them has been better, but they are in the minority. Orders going are rarely for large equipment, but for small powers there is a fairly good demand. Yet wherever there is a chance to defer purchasing, this is done.

Power transmission machinery has had a fairly good demand during the past few weeks, with the outlook a little brighter. Woodworking machinery merchants say they have been fairly busy during July, but add that trade is still far from being satisfactory. In machinists', contractors' and engineers' supplies nearly normal trade conditions have prevailed during the past month.

There is nothing of particular interest to say concerning the foreign machinery trade during the past month. In electrical machinery some excellent business has been done. Machine tool men have been fairly successful during the month, also, and think that with trade conditions in parts of Europe improving, they will increase their sales appreciably later on.

The Niles-Bement-Pond Co. found trade very satisfactory during July. Outside of contracts already noted, the company booked many small orders, which made up a good monthly aggregate. The company believes underlying conditions in trade to be very encouraging, and lays great stress on the frequency with which big interests have purchased machinery recently, saying it will inspire the general run of buyers to make their purchases also.

The Ingersoll-Sergeant Drill Co. note an appreciable increase in their orders during July, outside of the order received from the O'Rourke Engineering Co. for eight air compressors aggregating some 32,000 cubic feet per minute.

The A. & F. Brown Co., builder of power transmitting machinery, reports trade to be improving. July business was a little better than for June and inquiries were especially good.

Hill, Clarke & Co.'s local branch office did a very satisfactory business during the past month, mostly in one and two tools at a time. They were compelled to turn down an order for twelve small turret engine lathes, in consequence of inability to deliver them in two weeks as desired.

Thayer & Co., Inc., manufacturers of steam boilers, report trade in their line to have developed many hopeful features recently. They are bidding on considerable work.

Paul Bigelow, the local representative of the Buckeye Engine Co., booked the following orders during the past month: One 300-h. p. engine, from the Danbury & Bethel Gas & Electric Light Co., Danbury, Conn.; one 165-h. p. engine, from the Bronze Powder Co., Stamford, Conn.; and one 150-h. p. engine, from the American Tobacco Co., this city.

Crocker-Wheeler Co. found business very good during the past few weeks in electrical equipment, with small orders predominating, but making a gratifying monthly exhibit.

Manning, Maxwell & Moore did a large machine tool trade during July. In addition to the large contract mentioned above, their smaller orders showed a substantial increase also.

The Prentiss Tool & Supply Co., which represents many standard machine tool interests, booked some excellent business recently. An appreciable increase in inquiries is noted also; the machine tool business heretofore existing under the name of the J. R. Vandyck Co. has been merged in a corporation to be known as the Vandyck-Churchill Co., with offices at 8 Dey street, this city. The company has been capitalized at $50,000, under the laws of New York State.

The firm of John F. Allen, 370-372 Gerard avenue, New York, recently entered into agreement with John Turnbull, Jr. & Sons, 190 West George street, Glasgow, Scotland, whereby they are to handle the Allen riveters for one year in Great Britain. Negotiations were completed by Campbell Turnbull, who is now in this country looking over American methods and arranging for the agencies of several tools which his firm believes can be sold largely in England if properly introduced.

The Deering Harvester Works, the McCormick Harvester Works and the Plano Harvester Works, constituent companies of the International Harvester Co., were closed down Aug. 1. The company's officials stated that the shut down was ordered that an inventory of all stock may be taken and that the plants will be started again in a few weeks.

PRODUCTION OF COAL IN 1903.

Returns made to the United States Geological Survey show that the United States has again exceeded all previous records in the production of coal. The forthcoming report on the country's coal production, which Mr. E. W. Parker, statistician, will soon make, will show that the total output of the coal mines of this country in 1903 amounted to 359,421,311 short tons. This is an increase of 57,830,872 short tons, or 19 percent over the production of 1902, which amounted to 301,590,439 tons. The production of 1903 was nearly double that of 1893, and more than three times the output of 1883. The increase of production in 1903 over 1902 was equal to the total production of all kinds of coal in 1878, only twenty-five years ago.

Large and significant as was the increase in the amount of coal produced, the increase in the value of the product was still more noticeable. The value of the coal product at the mines in 1903 amounted to $506,190,733, which, compared with the value of the output in 1902 ($367,032,069), shows an increase of $139,158,664, or nearly 38 percent. The percentage of increase in value was almost exactly double that of the increase in production—a significant fact which social scientists may interpret as they please.

Of the total production in 1903, 74,313,919 short tons (66,351,713 long tons) represent Pennsylvania anthracite, valued at $152,036,448. This is in contrast to the production of 1902, when the output was curtailed by the prolonged strike in the anthracite regions and reached only 41,373,596 short tons (36,940,710 long tons), valued at $76,173,586. The increase in anthracite production in 1903 over the production of the previous year was 32,940,324 short tons (29,411,003 long tons) or nearly 80 percent in quantity, and $75,862,862, or nearly 100 percent in value. The production of bituminous coal (which includes lignite, or brown coal, semi-anthracite, semi-bituminous and cannel coal, and scattering lots of anthracite) amounted to 285,107,392 short tons, valued at $354,154,285, which, as compared with 1902, when the production was 260,216,844 short tons, valued at $290,858,483, shows an increase of 24,890,548 short tons, or a little over 9 per cent in quantity, and of $63,295,802, or a little less than 22 percent in value.

From this it appears that 57 percent of the total increase in production, and 54 percent of the increase in value was due to the return of normal conditions in the anthracite fields of Pennsylvania. The average price for a ton of bituminous coal, which is obtained by dividing the total value by the product, was $1.24 for a short ton in 1903 and $1.12 in 1902. The average price of a ton of anthracite coal was $2.05 in 1903, as against $1.84 in 1902.

COAL PRODUCTION OF THE UNITED STATES IN 1903 BY STATES.

State.	Total product.	Total value.
Alabama	11,832,124	14,374,746
Arkansas	2,293,593	3,372,536
California and Alaska	105,620	306,118
Colorado	7,639,268	9,109,810
Georgia and North Carolina	434,260	546,759
Idaho	4,250	13,250
Illinois	37,206,667	43,559,691
Indiana	10,905,842	13,367,859
Indiana Territory	3,517,388	6,386,463
Iowa	6,852,686	11,304,638
Kansas	5,867,208	8,930,271
Kentucky	7,431,016	7,877,332
Maryland	4,783,083	7,084,453
Michigan	1,410,909	2,787,742
Missouri	4,303,332	6,913,444
Montana	1,505,576	2,472,823
New Mexico	1,543,466	2,105,685
North Dakota	301,105	456,315
Ohio	25,004,893	32,195,275
Oregon	91,144	221,031
Pennsylvania	103,271,057	121,832,539
Tennessee	4,797,346	5,978,555
Texas	926,759	1,505,383
Utah	1,681,409	2,026,038
Virginia	3,511,307	3,365,149
Washington	3,196,273	5,384,939
West Virginia	30,250,408	34,758,490
Wyoming	4,709,393	5,916,951
Total bituminous	285,107,392	354,154,285
Pennsylvania anthracite	74,313,919	152,036,448
Grand total	359,421,311	$506,190,733

Of the thirty States and Territories which contributed to the output in 1903, increased production over 1902 was shown in all but four. Two of those in which the production decreased were among the eastern States, Maryland and Georgia, and two were in the Rocky Mountain region of Colorado and Montana. The greatest decrease was shown by Maryland and was probably due to the largely increased output of Pennsylvania anthracite. Colorado's production fell off only 32,000 tons, notwithstanding the fact that mining operations were seriously affected by labor troubles. There was only one State, Georgia, in which the value of production was less than in 1902.

Next to the increase in the output of Pennsylvania anthracite the most important gains were shown by West Virginia, 5,679,582 short tons; Pennsylvania bituminous, 4,696,690 tons; and Illinois, 4,267,294 tons. The increases and decreases by States are shown in the following table:

INCREASE OF COAL PRODUCTION IN 1903 OVER 1902.

State	Tonnage increase	Increase in value
Alabama	1,477,554	$ 1,955,080
Arkansas	349,661	833,322
California and Alaska	18,424	32,720
Colorado	a- 32,075	711,998
Georgia and North Carolina	a- 2,823	a- 76,759
Idaho	2,220	8,070
Illinois	4,267,294	9,613,781
Indiana	1,458,419	2,968,199
Indian Territory	696,722	2,121,357
Iowa	947,920	2,644,351
Kansas	601,143	2,067,484
Kentucky	664,032	1,210,365
Maryland	a- 488,516	1,504,584
Michigan	446,191	1,134,550
Missouri	413,178	1,538,802
Montana	a- 55,247	29,376
New Mexico	494,703	605,456
North Dakota	74,594	130,348
Ohio	1,484,999	5,241,486
Oregon	25,496	60,956
Pennsylvania	4,696,690	15,800,079
Tennessee	414,378	578,834
Texas	24,847	28,138
Utah	328,314	228,584
Virginia	328,314	821,554
Washington	515,059	812,644
West Virginia	5,679,582	10,009,832
Wyoming	279,902	680,612
Total bituminous	24,890,548	63,295,802
Pennsylvania anthracite	32,940,324	75,862,862
Grand total	57,830,872	$139,158,664

a—Decrease.

In order that some idea of the bulk represented by the coal production of the United States in 1903 may be obtained, it might be stated that, if the entire production were loaded on freight cars with a capacity of 30 tons each, the trains containing it would encircle the globe at the equator about three and one-third times. If the entire production were loaded on freight cars in one day, the trains would occupy one quarter of the entire railway trackage of the United States. Taking an average of 30 cars to a train, it would require sixteen times as many freight locomotives as there are in the United States to move this tonnage in one day. If spread over the surface of Manhattan Island, which has an area of 22 square miles, the entire island would be covered to a depth of nearly 25 feet.

The Ohio plant of the Carnegie Steel Co., Youngstown, O., resumed operations this week. The plant was off one week for repairs. Furnace No. 3 which has been idle since the middle of last March was blown in, making three blast furnaces in operation at this plant. The continuous mill at the Ohio works continues idle, however.

The Willamette Iron & Steel Works, Willamette, Ore., has sublet the contract for the construction of the new ninety-ton government steamer, to be built for the United States Engineer Corps, to the Portland Shipbuilding Co.

The tanning machinery department of the Vaughn Machine Co., Peabody, Mass., has been acquired by the Turner Tanning Machinery Co., of Boston.

Relation of Cost Accounting to Commercial Management.

BY KENNETH FALCONER.

["Cost accounting is as much concerned with the transactions involved in buying and selling, and with the commercial and financial results as with the productive operations and their effects."]

Those in control of what may be termed the productive management of the most successful of modern shops and factories fully realize the "dollar and cent value" of accurate and reliable cost accounting. From being looked upon as a means of securing records of the cost of product, and in addition a certain amount of more or less interesting information regarding the operations of the shops, productive engineering, as it is sometimes called, has come to be recognized as in itself a force towards economical production—a factor, the efficiency of which is in direct proportion to the accuracy and detail of the information it supplies, and the effects of which are only limited by the degree to which judicious action is based on study of such information.

The reverse side of the medal is the attitude of those in whose hands lies the commercial control of factories, and it is to regretted that the value of specialized industrial accounting in relation to the selling department and to the commercial branch of management is not more generally recognized. If carefully designed and conscientiously carried out in all its details, a system of factory accounting should exercise as direct a force towards increase of sales as towards economy of production, and it is as legitimately its function to furnish periodical information regarding the commercial position and relations of the business as to supply records concernng operations and transactions relating to its productive work. On the one, as on the other, judicious action may be based, or prudent lines of conduct be adopted tending directly and in no small degree towards ultimate success; this, notwithstanding the fact that its value as a factor in productive management is based on different grounds from those which give it usefulness in connection with the commercial control of a manufacturing business. In the former it should unerringly point out the nature of the influence resulting from each individual detail of shop management and from every mechanical method in use. It should clearly show whether each one of the innumerable details of the operations and transactions of the factory proper are executed with the maximum of economy and the minimum of wastefulness. In its relation to the commercial branch of the business its function is rather to show at regular periods the final result;—the ultimate effect—of the thousand and one details of the work not only of the shops and other departments of the factory, but of every department and branch of the business each one of which must take for or against economy of production or efficiency of management. Like the science of navigation, one branch of its work records the direction in which different winds and currents are exerting their influence, whether towards the port of success or the reefs of failure. The other field of its usefulness is in showing at stated intervals the actual position of the ship. Cost accounting in the factory should tell "which way we are going;" in the office, "where we are at."

As the best results of cost accounting can only be secured when the factory office is working in entire harmony with all the shops and other departments of the factory, so the best results of factory accounting in its relation to the selling and commercial organization can only be secured when the entire system is so planned that the specialized work of the factory office, and the general accounting of the commercial office together form one connected whole. The details and particulars of what one presents in the aggregate should be supplied by the other—that each should show the aggregate of what appears in detail in the other is quite as essential. Failure to admit the distinction here involved is frequently responsible for a most regrettable limitation of the scope and usefulness of factory accounting.

The description here given and forms illustrated are part of a system which while it has proved its efficiency in the shops was designed with the additional object of securing the best possible results in relation to the work of the selling department and of the commercial branch of the management. It was not planned with the idea of installing any specialized system of commercial bookkeeping. The general plan of ac-

Note A. List of Accounts.

CLASS A. PLANT AND EQUIPMENT ACCOUNTS.

Name.	Sub-Accounts.
Real Estate and Buildings.	Factory.
Real Estate and Buildings.	Foundry.
Real Estate and Buildings.	Offices.
Real Estate and Buildings.	Fences and Sheds.
Factory Equipment.	Each Shop and Department.
Foundry Equipment.	Each Shop and Department.
Store Room Equipment.	
Stock Room Equipment.	
Drawing Room Equipment.	
Office Equipment.	

CLASS B. MATERIAL ACCOUNTS.

Stores.	Purchased.
Stores.	Manufactured.
Stores.	Scrap.
Stock.	Purchased.
Stock.	Manufactured.
Fuel.	Foundry.
Fuel.	Steam.
Fuel.	Miscellaneous.
*Production.	Each productive shop.
*Construction.	Each plant and equip. acct.

(*These accounts represent product or plant and equipment in process of manufacture.)

CLASS C. MAINTENANCE ACCOUNTS.

Maintenance of each account in Class A.	Same as corresponding accounts in Class A.

CLASS D. EXPENSE ACCOUNTS.

**Shop Expenses.	Each Shop and Department.
**Foundry Expenses.	
†Factory General Expenses.	As found advisable.
Store Room Expenses.	
Stock Room Expenses.	
‡Sales Expense.	City.
‡Sales Expense.	Country.
¶General Expense.	

**All manufacturing expenses chargeable to specified shops.
†All otner direct manufacturing expenses.
‡All direct selling expenses.
¶All expenses not included above.

CLASS E. TRADING ACCOUNTS.

*Sales.	City.
*Sales.	Country.
Returns and Allowances.	City.
Returns and Allowances.	Country.

*Charges with cost of goods sold credited with price charged customer.

CLASS F. COMMERCIAL ACCOUNTS.

Accounts Payable.	American.
Accounts Payable.	Foreign.
Bills Payable.	Foreign.
Accounts Collectible.	City.
Accounts Collectible.	Country.
Bill Receivable.	City.
Bills Receivable.	Country.
Fixed Charges.	A sub-account for each.
Advertising.	
Wages.	

CLASS G. REVENUE ACCOUNTS.

*Factory Cost Advance.	Each Shop and Department engaged in producing output.
*Foundry Cost Advance.	
†Stores Cost Advance.	
†Sales Cost Advance.	City.
†Sales Cost Advance.	Country.

*An amount based on a rate per productive hour added to the labor and material cost of output and representing that element of cost known as manufacturing expense.

†A similar provision for expenses of stores department and of selling, based on a percentage of value of stores issued or goods sold.

CLASS H. MISCELLANEOUS ACCOUNTS.

Private Ledger Account.

(This is an adjustment account for bookkeeping purposes. In itself it represents the aggregate of the various accounts kept in the ledger of the same name.)

NOTE.—The aggregate of each month's entries to each account on this list, and the balances outstanding to each, are recorded each month on the Works Ledger Summary (Fig. 3). The details of each item appearing under its several sub-accounts.

counting was on a most satisfactory basis, and the purpose of the factory system in relation thereto was not to change or to alter it, but rather to secure from it, and tabulate in detail, such information as might afford grounds of action making for increase of profits or lessening of losses; just as in the factory the object sought was the effecting of economies or the lessening of expenses. The only point in which the general system of accounting was modified was in the mechanical construction of the books of original entry in use. The ruling of these is to a slight extent determined by the requirements of the factory office, but the actual treatment of any entries or account in the commercial books was not altered in the least.

The basis of what may be termed the commercial side of specialized accounting for a manufacturing business is in a carefully planned and well balanced list of representative accounts. The end always kept in mind is the grouping planned to meet the requirements of this list of accounts, and as regards books of original entry is determined after consultation between the Factory and the General Accountant. As stated before, this is the only point upon which the factory office exercises any influence on the commercial in relation to the work of the latter.

All expenditures of labor and material are distributed to the various accounts by means of factory orders—salary account by a monthly transfer entry, the information for which after being once supplied to the factory accountant holds good until a change is made in the amount of the firm's salary list. The system calls for no additional work by the staff of the commercial office, and the only special effort demanded is absolute accuracy in the use of the different columns in the books of original entry.

There is one point in the practice of the firm for which this

DATE	Transfer Entry		Sub. Accounts	TOTAL
	No.	Distribution of		

THE IRON TRADE REVIEW

Fig. 1—Subsidiary Ledger. This book presents the same information as the Works Ledger, each item, however, being distributed among several subsidiary accounts (see Note A).

together of all similar expenditures or transactions for each month, whether recorded by means of shop orders or through commercial books, the aggregate appearing under the various accounts in what is known as the "Works Ledger."

Note A is a partial list of the accounts of this ledger. As will be seen, they are divided into groups or classes, and the use of a loose leaf ledger to enable new accounts to be inserted in their proper position is advisable, though not essential. In connection with the Works Ledger, a subsidiary ledger (Fig. 1) is kept, in which are found the details of the various accounts in the works ledger, with the exception of those under the headings "Accounts Payable," "Accounts Collectible," and "Private Ledger." Details of each of these, the titles of which explain themselves, are found in the ledgers corresponding in name, the aggregate of the entries and balances appearing in these individual ledgers being found in the Works Ledger. Accounts Payable and Accounts Collectible system was originally designed, which would appear open to criticism; that is the fact that no postings are made from any of the books direct to the Works Ledger; the cash book, bill book, sales books and journal are all summarized each month into a transfer entry from which the amounts are posted. As the Private Ledger, and the two personal ledgers, Accounts Payable and Accounts Collectible, both carry adjustment accounts which render them entirely independent of the Works Ledger, this point does not affect the regular work of the office in the least. The idea was primarily to provide for distribution of the amounts which would ordinarily be posted directly to the accounts in the Works Ledger into their proper sub-accounts so that full detail and anaylsis of their aggregate would be secured for entry into the subsidiary ledger. A further requirement in this individual case was that the management wanted the fullest possible information put into the shape of monthly reports for purposes

Distribution of _____ *for* _____ *19*

Class _____

ACCOUNT	Sub. Acct.	DEBIT				CREDIT			
		Sub. Led.		Wks. Led.		Sub. Led.		Wks. Led.	
		Fol.	Amt.	Fol.	Amt.	Fol.	Amt.	Fol.	Amt.

THE IRON TRADE REVIEW

Fig. 2—Transfer Entry. This form is duplicated in two colors, one used for debits and one for credits. Names of accounts and subaccounts (see Note A) are printed, those of each class being on separate sheets. A transfer entry showing the distribution of wages would be this form, the color used for credits, containing the accounts of Class F followed by the debit sheets of each class containing any account upon which labor has been expended during the month—probably Classes A to E. Distribution of the Sales Books would be a credit from Class E followed by a debit of F.

in common with all other accounts are subjects of comparative statements each month, the totals as shown being capable of proof by comparison with the trial balance of the personal ledgers. Private Ledger account is an adjustment account in so far as the general accounting system is concerned, the ledger of that name being simply used for accounts which, whether personal or representative, in no way or degree affect the business as a productive organization or its position as a selling, and knowledge concerning which the executive desire to be confined entirely to themselves.

It is not necessary to refer to the mechanical get up of the office books further than to say that the ruling of each is of study and comparison. This point is thoroughly covered by the use of these transfer entries, not only to show the distribution of wages and of material expended, but to supply a monthly analysis of the entries recorded in the books. Fig. 2 is a specimen of the form used, and will be seen to be perforated so that the sheets can be inserted in the transfer entry binder in their correct relative position each month; distinctive colors are used for charges and credits. At the close of a half year, this binder, in addition to showing distribution of wages and material for six consecutive months contains a summary for each month of all the records of the business, as shown by each of the books used in the general

office, those for each being found in regular sequence, as for instance, all cash receipts from January to June, all cash disbursements for each month, etc., etc.

So far as their nature and use are concerned these transfer entries whether made up from factory orders, or from the office books are practically journal entries gotten up in such form as to show the distribution of all charges and credits affecting the condition of the business amongst the subdivision of the various accounts in the Works Ledger. In themselves they form a most comprehensive report of the work of each month. Note B is a partial list of the transfer entries compiled from the office books and the shop orders. Examination of this list will show that each will present information of the greatest value for purposes of comparison either with similar records for previous periods, or with data and information of related interest.

A further report furnished each month to the management is shown in Fig. 3 and is known as the "Works Ledger Summary." This is practically a grouping together of all similar charges or credits as shown in the various transfer entries for each month, and a presentation of the total distributed among the different subdivisions of each account, and in addition, the balance remaining at debit or credit as the case may be, also distributed among the subsidiary accounts. It is made out on identically the same lines as the list of accounts, the various classes of accounts appearing in the same sequence. Like the transfer entries, this is a printed form, accounts belonging to the different classes being on separate sheets. The Works Ledger summary is made up from the subsidiary ledger, its correctness being proved by comparison with the monthly trial balance of the Works Ledger with which it must absolutely agree. The space left for remarks, if judiciously used, may prove of the greatest value to those for whose benefit these reports are gotten up by referring to previous records, the relation of which to current data may be evidence of either satisfactory or unsatisfactory conditions. Like the transfer entries, these reports are made up on sheets perforated for binding. In the case under consideration both are identical in size and shape, and are bound together, similar transfer entries for each month following each other consecutively, the monthly Works Ledger summaries being at the back of the binder arranged according to months, and six months' records constituting a volume.

Works Ledger Summary for _____ 19____

Acct.	Sub. Acct.	Totals for Month				Balance				REMARKS
		Debit		Credit		Debit		Credit		
		Sub. Acct.	Acct.	Sub. Acct.	Acct.	Sub. Acct.	Acct.	Sub. Acct.	Acct.	

THE IRON TRADE REVIEW.

Fig. 3—Summary of Works Ledger. Names of accounts and sub-accounts are printed, those of each class being on separate sheets. The totals of each sheet are carried forward and the accuracy of the figures proven by cross addition of totals and comparison with the monthly trial balance of the Works Ledger.

Note B. Monthly Transfer Entries.

Distribution of Material used. Wages paid. Salaries. Fixed Charges.	Showing various accounts and sub-accounts on which expended.
Cash Book. Bill Book. Sales Book. Journal Book.	A summary of the month's records of each; accounts payable representing the aggregate of open liabilities; accounts collectible of open customers' accounts; bills payable and receivable, the aggregate of each covered by notes not matured.

Cincinnati Machinery Market.

August 2.

Taken as a whole the market may be regarded as in satisfactory condition. There continues to be much of irregularity in the reports of machine tool manufactures as to the business done in the past quarter of the year, but there is now a more decided feeling that the balance of the year will be productive of a better run of orders, and that instead of here and there a shop with a rather unsatisfactory business, the indications are that improvement will be more general. Some large orders were booked by Cincinnati manufacturers during the month. One order for planers amounting to $20,000 was booked by one concern, and another maker of lathes secured one round lot order for seventeen lathes from twenty-four inches up. The order for planers is said to be the largest single planer order ever placed. These orders came out of railroad buying, and it is said that the Illinois Central, the Central of New Jersey, and the A., T. & S. F. were conspicuous in the buying during the month. This resumption of railroad buying is regarded as significant, and is one of the most encouraging trade features that has developed for some time. It is reported that there is quite a good inquiry pending and all the shops are optimistic as to the outlook. Foreign business is not so much of a feature as it was last month, although there is still some foreign business coming along, but there seems to be less interest taken in the foreign markets than there was six and eight weeks ago.

The policy generally among the shops is to run only on orders and not to make stock. This in some cases keeps the shop forces down to a rather low level compared with full capacity.

Prices are well maintained, especially in cases where new lines of tools have been put out. Manufacturers that can claim high efficiency for their machines are not inclined to shade the price. Sales are mainly for single machines, and there are but few orders for groups of machine tools aside from the orders placed by the railroads, as mentioned above. A maker of automobiles was said to have placed a good-sized order here recently. From inquiry among the shops this month, it seems that June was a better month than the trade cared to give out. For some reason there was a reticence shown in giving out the amount of business done. It now develops that two of our shops had big orders in June, and one of these concerns reports that the month was the largest in the history of the company.

The Bradford Machine Tool Co. had a good run of orders in July, but calls trade moderate on the whole, but up to expectations under present conditions. The outlook for fall business is regarded as quite encouraging.

The Cincinnati Machine Tool Co. is moving this week into the new shop recently erected. The new building is an ornament to the machine tool district and is in every respect up to the standard of the Cincinnati shops. The company has had the advantage of the experience of the other machine tool builders who have built so many new shops here in the past two years and has profited accordingly. The new shop is 185 x 60 feet. There are to be six overhead cranes. A new 250-h. p. "Greenwald" engine is being installed, a 100-

h. p. Jantz & Leist Electric Co. generator and motors of the Triumph Electric Co., Crocker-Wheeler Co., Robins & Meyers are to be used.

The American Tool Works Co. reports no change in conditions, and summer business is about as expected. The company has had some orders from Russia and Germany, which, under present conditions were somewhat unexpected. The outlook for fall based on correspondence and inquiry is encouraging.

The Rahn-Meyer-Carpenter Co. is running full time and making no stock, as orders are in hand for all the machines going through. The company reports a good deal of business pending, which argues well for the fall and winter prospects for business.

Schumacher & Boye have had a large run of orders this month and secured a part of the big railroad purchase together with several other good sized orders. These sales place this shop in good active condition.

The Lodge & Shipley Machine Tool Co. finds the general tone of the market good and outlook better than for some time. A large amount of business is pending which purchasers seem slow about closing up, but orders are fair, and the fall and winter promise to show improvement.

The John Steptoe Shaper Co. had a better month in July than in June, and is still running full time and entirely on orders and making no stock. A little stock was made in June which has all been disposed of this month.

The Queen Cityt Machine Tool Co. makes shapers exclusively. The company reports inquiry moderate, but regards the situation as to the future as fairly encouraging.

Greaves, Klusman & Co. are running full time and full force with a good run of orders for engine lathes. The orders for pattern making machinery have been especially good.

The Cincinnati Milling Machine Co. is optimistic. Having had a big June business and a good July, the company is counting on further improvement for the balance of the year.

A SOLID BALL UNIVERSAL JOINT COUPLING.

The Boston Gear Works, of Boston, Mass., has recently applied for a patent on an improved solid ball universal joint coupling. This joint is dust proof and oil retaining. It is very strong, and is perfectly free from projections and therefore prevents any danger that might thereby arise. It is a neat joint and is simple in its construction, having only seven main parts. These are very compact and the only space inside of the joint which is open is used for holding a lubricant. There is a screw plug, which gives an opportunity of filling the centre of the ball with oil.

SOLID BALL UNIVERSAL JOINT COUPLING.

The ball is made in one piece and is therefore stronger than when split. The bearing surfaces are very large and have a perfect spherical bearing direct on the ball. The ball is hardened and ground to exact dimensions, giving a perfect and constant bearing on a very large surface.

There are two styles of each size; style A made for extra heavy duty, and for angles up to 15 degrees, measured from a straight line, or 30 degrees total angular movement of the joints. Style B, not so strong as the above, for angles of 30 degrees, measured from a straight line, or 60 degrees total angular movement of the joints.

The city of Streator, Ill., has offered to donate the Illinois Steel & Tool Co. five acres and take $50,000 worth of preferred stock, provided the company will move its plant from Peoria to Streator.

THE NEW STEEL CORPORATION DIRECTOR.

Thomas Morrison, of Pittsburg, who was elected last week a member of the board of directors of the United States Steel Corporation to succeed Charles M. Schwab, is one of a number of well-known steel experts that graduated from the Carnegie Steel Co. Less than twenty years ago he came to this country from Scotland and secured a position with the Carnegie Steel Co., and upon his retirement last year he was superintendent of the Edgar Thomson works, one of the most important in the Carnegie group. He was born Dec. 5, 1861, and received a common school education in Dunfermline, Scotland. Much of his spare time was devoted to drawing, and upon leaving school he served an apprenticeship as a machinist and engineer, and also received instruction in mechanical drawing. In 1886 he came to the United States and his first position was in the Homestead Steel Works as a machinist. He soon advanced to the position of foreman of the machine shop and later became assistant master mechanic. He was promoted rapidly and finally was put in charge of the armor plate department. When Andrew Carnegie acquired the Duquesne Steel Works in 1891 Mr. Morrison was made superintendent. In 1895 he became general superintendent of the Edgar Thomson works. He retired from this position June 1, 1903. He also was a director in the Carnegie Steel Co. Although Mr. Morrison retired from active business he is still largely interested in glass and coal companies.

THOMAS MORRISON.

Pennsylvania Rail Order.

The Philadelphia *Press* says that the Pennsylvania Co. will order for delivery next year only about half the amount of steel rails ordered for 1904. The Pennsylvania order for 1904 was placed in June, 1903, and was for 202,000 tons.

The Lackawanna Railroad is spending a large sum of money in the construction of heavy bridges over waterways and highways on the branch between Binghamton and Owego to the end that the largest types of locomotives may be used on that division.

The contracts for about $1,000,000 worth of gun forgings for the government have been divided equally between the Bethlehem Steel Co. and the Midvale Steel Co. These companies, as noted last week, were the only bidders and each bid thirty cents per pound.

The Colorado Fuel & Iron Co., Pueblo, Col., has received an order for 4,000 tons of eighty-five-pound steel rails for the White River branch of the Missouri Pacific Railway extending from Carthage, Mo., to Memphis, Tenn.

The Sylvan Steel Works, of the Republic Iron & Steel Co., have resumed operations. This company's plant at Toledo will also resume operations August 4, after being idle for a month. The Massillon plant resumed August 2.

The American Car & Foundry Co. has received an order for 2,000 box cars from the St. Louis Southwestern Railway Co., and some of these cars will probably be manufactured at the Memphis plant recently purchased from the Southern Car & Foundry Co.

The plant of the Anderson Malleable Iron & Manufacturing Co., Anderson, Ind., has been sold to David C. Miller and J. A. Ross, of Greenville, O.

PIG IRON PRODUCTION, FIRST HALF OF 1904.

We printed last week the totals shown by the official figures of the American Iron and Steel Association for the production of various classes of pig iron in the United States in the first half of 1904. We now give the details as presented in the current issue of the *Bulletin* of the Association. With the exception of five charcoal furnaces, all controlled by the same interests, complete reports were received from every blast furnace in the country. For the five charcoal furnaces careful estimates have been made, based on former official reports and on information received from other reliable sources.

The production of pig iron in the first half of 1904 was 8,173,438 gross tons, against 8,301,885 tons in the last half of 1903 and 9,707,367 tons in the first half of 1903. The decrease in production in the first half of 1904 as compared with the second half of 1903 amounted to only 128,447 tons, but as compared with the first half of 1903 it amounted to 1,533,929 tons. The united production of the second half of 1903 and the first half of 1904 amounted to 16,475,323 tons, against 18,720,100 tons in the second half of 1902 and the first half of 1903, when the boom was at its height, a falling off of 2,244,777 tons. And yet the production in the first half of 1904 was greater than in any half year prior to the second half of 1901. The table below shows the number of active furnaces on June 30 and the production by States.

TOTAL PRODUCTION OF PIG IRON.

States	Blast Furnaces				Production Gross tons of 2,240 lbs. (Includes Spiegeleisen)		
	In blast Dec. 31, 1903	June 30, 1904			First half of 1903	Second half of 1903	First half of 1904
		In	Out	Total			
Massachusetts	1	1	1	2	1,419	1,846	1,242
Connecticut	2	1	2	3	7,142	7,359	4,325
New York	7	10	12	22	270,443	282,474	250,980
New Jersey	7	5	7	12	106,387	105,280	121,291
Pennsylvania	57	83	72	155	4,498,038	3,713,462	3,713,867
Maryland	4	3	3	6	166,801	157,769	135,116
Virginia	12	12	14	26	322,529	221,505	189,037
N. Carolina			1	1	34,001	41,601	40,518
Georgia	4	3	1	4			
Alabama	30	25	24	49	777,870	783,528	800,256
Texas	1	1	3	4	5,023	6,630	3,834
West Virginia		4		4	106,970	92,043	103,153
Kentucky	3	2	5	7	53,034	49,407	17,516
Tennessee	14	11	11	22	227,259	191,109	165,883
Ohio	22	31	28	59	1,860,334	1,427,100	1,540,743
Illinois	4	13	9	22	838,655	853,720	798,221
Michigan	10	4	7	11	111,953	132,756	138 744
Wisconsin	3	3	3	6	157,241	126,275	104,437
Minnesota			1	1			
Missouri	1	2		2			
Colorado		2	3	5	162,268	108,021	46,982
Oregon			1	1			
Washington			1	1			
Total	182	216	209	425	9,707,367	8,301,885	8,173,438

The production of bituminous coal and coke pig iron in the first six months of 1904 amounted to 7,337,279 gross tons of anthracite and coke mixed to 607,624 tons, of anthracite alone to 15,179 tons, and of charcoal to 213,356 tons. Included in the bituminous figures is a small quantity of ferro-silicon made with electricity.

The production of charcoal pig iron in the first half of 1904 was 213,356 gross tons, against 272,040 tons in the last half of 1903 and 232,717 tons in the first half of 1903. In addition there were produced in Wisconsin and Washington 927 tons of mixed charcoal and coke pig iron in the first six months of 1903. No iron has been made with this fuel since the first half of 1903. The following table shows the production according to fuel, also the distribution of unsold stocks according to fuel on the dates named:

UNSOLD STOCKS AND PRODUCTION ACCORDING TO FUEL.

Fuel.	Stocks Unsold Gross tons of 2,240 lbs.				Production Gross tons of 2,240 lbs. (Includes Spiegeleisen)		
	Dec. 31, 1902	June 30, 1903	Dec. 31, 1903	June 30, 1904	First half of 1903	Second half of 1903	First half of 1904
Bituminous	38,645	97,094	407,881	381,201	8,401,001	7,191,220	7,337,279
Anth. and anth. & coke	4,080	15,673	62,901	49,740	1,072,722	838,625	622,803
Charcoal	7,226	12,934	120,656	192,313	233,644	272,040	213,356
Total	49,951	126,301	591,438	623,254	9,707,367	8,301,885	18,009,252

The statistics of unsold stocks do not include pig iron sold and not removed from the furnace bank, or pig iron manufactured by rolling-mill owners for their own use, or pig iron in the hands of consumers. The stocks which were unsold in the hands of manufacturers or their agents or were under their control in warrant yards or elsewhere on June 30, 1904, amounted to 623,254 tons, against 591,438 tons on Dec. 31, 1903, 126,301 tons on June 30, 1903, and 49,951 tons on Dec. 31, 1902.

On June 30, 1904, the American Pig Iron Storage Warrant Co. had 78,600 tons of iron stored in its various yards, virtually all of which was controlled by the makers, and all of which is included in the 623,254 tons of unsold iron reported on that date. On Dec. 31, 1903, the company had 47,200 tons in its yards, of which 40,149 tons were controlled by the makers and 7,051 tons were in other hands. No pig iron whatever was stored in its yards on June 30, 1903, or on Dec. 31, 1902. The distribution of unsold stocks at the end of the last four half-year periods is shown as follows by States and in the case of Pennsylvania and Ohio by districts:

TOTAL STOCKS OF UNSOLD PIG IRON.

States	Gross tons of 2,240 lbs.			
	Dec. 31, 1902	June 30, 1903	Dec. 31, 1903	June 30, 1904
Massachusetts and Conn.	229	477	3,452	3,142
New York	2,061	4,895	12,932	26,517
New Jersey	700	2,100	9,892	14,959
Pennsylvania	5,122	24,413	106,472	114,477
Maryland and Virginia	6,791	16,756	25,823	69,880
North Carolina, Ga., and Tex.		2,416	10,226	31,576
Alabama	22,404	30,619	234,828	110,814
Kentucky and West Va.	1,125	5,316	16,422	2,315
Tennessee	3,554	11,408	22,019	15,781
Ohio	4,457	20,073	72,189	99,942
Michigan and Minnesota, Illinois and Wisconsin, Missouri and Colorado, Pacific States	2,908	7,828	77,183	133,851
Total	49,951	126,301	591,438	623,254

STOCKS OF PIG IRON IN PENNSYLVANIA AND OHIO.

Pennsylvania.	Lehigh Valley	150	6,741	33,324	29,434
	Schuylkill Valley	400	1,034	14,079	5,580
	Upper Susquehanna V.	2,256	3,941	1,021	1,989
	Lower Susquehanna V.				
	Juniata Valley	1,598	5,263	19,617	12,170
	Allegheny County		500	1,200	
	Shenango Valley		3,610	9,222	23,202
	Miscellaneous bituminous		2,754	26,435	41,012
	Charcoal	718	570	1,574	1,090
	Mahoning Valley bitum.	2,503	7,348	47,849	55,624
Ohio.	Hocking Valley "				1,200
	Lake Counties "		905		8,368
	Miscellaneous "				9,548
	Hanging Rock "	865	11,107	19,475	21,442
	Hanging Rock charcoal	1,089	713	4,865	3,760

The production of Bessemer pig iron in the first half of 1904 was 4,530,946 gross tons, against 4,509,289 tons in the last half of 1903 and 5,480,619 tons in the first half of 1903. The figures for the first half of 1904 include 87,582 tons of low-phosphorus pig iron, against 110,699 tons in the last half of 1903 and 89,723 tons in the first half of that year.

The production of basic pig iron in the first half of 1904 was 1,061,901 gross tons, against 836,923 tons in the last half of 1903 and 1,203,803 tons in the first half of 1903. Basic pig iron made with charcoal is not included in these figures

The production of spiegeleisen and ferromanganese in the first half of 1904 was 114,206 gross tons, against 81,986 tons in the last half of 1903 and 110,675 tons in the first half of 1903. The production of ferromanganese alone in the first half of 1904 amounted to 26,541 tons, against 14,118 tons in the last half of 1903 and 21,843 tons in the first half of that year. In addition to the above Tennessee made 304 tons of ferro-phosphorus in the first half of 1904. The tables below show the production of Bessemer iron in the past six months, and in the first half of 1903 by states, and in Pennsylvania and Ohio by districts; also the production of basic iron in the same periods:

PRODUCTION OF BESSEMER AND LOW PHOSPHORUS PIG IRON.

States	Production Gross tons of 2,240 lbs. (Includes Spiegeleisen)		
	First half of 1903	Second half of 1903	First half of 1904
New York and New Jersey	39,112	90,211	98,651
Pennsylvania	2,783,209	2,429,934	2,265,111
Maryland	165,137	156,647	135,230
Virginia and Alabama	3,299		
West Virginia	106,970	91,718	102,117
Kentucky and Tennessee	9,615	17,241	11,020
Ohio	1,459,443	963,233	1,151,235
Illinois	710,199	676,484	700,872
Michigan, Wisconsin, and Minn.	75,096	36,244	39,430
Missouri and Colorado	128,539	47,577	27,280
Total	5,480,619	4,509,289	4,530,946

PRODUCTION OF BESSEMER AND LOW PHOSPHORUS PIG IRON IN PENNSYLVANIA AND OHIO.

Pennsylvania.	Lehigh Valley	37,722	68,462	41,836
	Schuylkill Valley	37,071	40,811	18,816
	Upper Susquehanna Valley			
	Lower Susquehanna Valley	187,902	180,843	137,007
	Juniata Valley			
	Allegheny County	1,738,122	1,538,728	1,525,195
	Shenango Valley	486,722	319,986	346,637
	Miscellaneous bituminous	293,670	281,104	195,620
Ohio.	Mahoning Valley	525,965	346,793	423,962
	Hocking Valley			
	Lake Counties	436,105	279,503	298,692
	Hanging Rock bituminous	52,830	48,142	63,391
	Miscellaneous bituminous	444,543	288,795	365,190

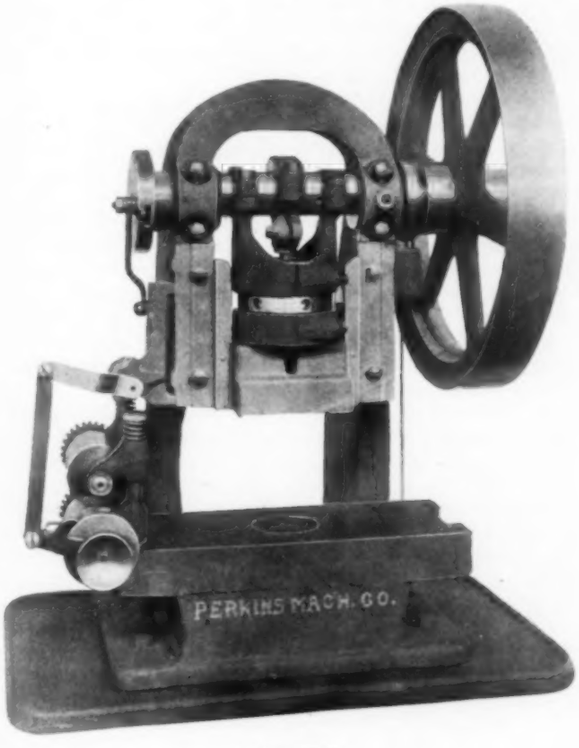
PRODUCTION OF BASIC PIG IRON, NOT INCLUDING CHARCOAL IRON.

New York and New Jersey	74,828	42,974	51,949
Pennsylvania—Allegheny County	426,970	384,205	542,398
Other counties	439,241	186,837	261,200
Virginia, Tennessee and Alabama	153,861	114,138	130,129
Ohio, Missouri and Colorado	108,903	128,769	76,225
Total	1,203,803	836,923	1,061,901

The whole number of furnaces in blast on June 30, 1904, was 216, against 182 on December 31, 1903, 320 on June 30, 1903, 307 on December 31, 1902, and 286 on June 30, 1902. The number of furnaces idle on June 30, 1904, was 209. Of the active furnaces on June 30, 1904, 170 used bituminous fuel, 26 used anthracite coal and coke mixed, 2 used anthracite coal alone, and 18 used charcoal alone.

A NEW DOUBLE ACTING PRESS.

This machine is a recent addition to the line of presses made by the Perkins Machine Co. of Warren, Mass., and has a capacity of drawing up a tube ¾ inch diameter by ⅜ inch deep and has a stroke of the outer or cutting plunger of ½ inch and of the inside or drawing plunger of 1½ inches. The press has a feed of 2½ inches obtained by the various leverages shown in the illustration. The feed is fully adjustable from a few thousandths of an inch up to the maximum capacity. Both plungers have ample adjustment and the



A NEW PRESS.

machine embodies all the improvements that the experience of the builder has found advisable for the manufacture of small press work of various kinds. This press weighs 300 lbs.

The Laughlin sheet mill, Martins Ferry, O., resumed operations in full this week. The plant has been operating only in part for some time.

STANDARD "FORM" FOR SHOP OUTINGS.

The Electric Controller & Supply Co. of Cleveland, recently enjoyed a picnic, and all hands from office and shop are reported to have had a very successful and delightful time. The program was skillfully arranged for a maximum amount of enjoyment and the items were detailed in shoppy fashion on a familiar form. On the back of the form illustrated is a list of the prizes furnished by the company for fourteen con-

Second Annual Picnic
of
The Electric Controller & Supply Company.

JOB ORDER CARD

Job No. *1904* Memo. No. *1903* Con. No. *1897*

Stock *Make and Assemble*

One good time

Drg. No., 7-23-04

This card must be kept with the job, and is the workman's authority for working on same, and must follow job to its completion.

Foreman

DATE	MATERIAL REQUIRED FOR ABOVE JOB.	COST.
	1 R. R. Ticket	
	1 Lunch Basket	
	1 Pretty Girl	
	10 hours of Sunshine	

Ship via Penna. R. R.
to
Silver Lake

Material *Large Crowd*
hrs. *10* Labor @ *Going Home*
hrs. *10* Expense @ *Next Day*
Total *Good Time*

PROGRAM OF THE ELECTRIC CONTROLLER & SUPPLY CO.'S EXCURSION.

tests inclusive of a base ball game between the shop and office and a variety of races, etc. The program is here reproduced.

The General Electric Co. has selected Cochrane feed water heaters for its plants at West Lynn, Mass., and Harrison, N. J., where Curtis steam turbines are to be installed. These heaters are rated at 3,000 and 1,000 horsepower respectively and will take the exhaust steam from the auxiliaries. Three 5,000-h. p. Cochrane heaters have also been installed in connection wit h steam turbines at the Delray (Mich.) station of the Detroit Edison Co., and a 600-h. p. Cochrane heater will be used in the new turbine station of the Iowa & Illinois Interburban Railway Co., Clinton, Ia. A 2,000-h. p. Cochrane heater, which has been ordered by the Electric Company of America will be installed with steam turbines in its new plant at Marion, Ind.

Thomas Lowry, of Minneapolis, has purchased the property at West Duluth, known as the old car works, owned by the Metropolitan Life Insurance Co., New York, which acquired it through defalcation on a mortgage. The plant includes a rolling mill with two trains of rolls; a foundry, 60x400 feet; erecting shop, 100x600 feet; a blacksmith shop, 75x150 feet; and engines with a capacity of 1,200 horsepower, and eleven boilers. Mr. Lowry has not announced what use he will make of the plant.

The Toledo Machine & Tool Co., Toledo, O., has purchased the plant of the Pontiac Sheet Metal Specialty Co., Pontiac, Mich., and will probably place it in operation.

THE INCREASING CAPACITY OF POWER SHOVELS

BY GEORGE E. WALSH.

The capacity of the steam shovel in the past year or two has increased about 100 percent, and where formerly 35 and 45-ton shovels were working in excavations or ore mines, we find today the 75, 85 and 95-ton shovels in most common use. The new fields in which the power shovels are used have increased in proportion to their capacity, and for excavation work, mine shoveling, railroad building, and for loading and unloading cars the modern steam shovels have become indispensable. Through their improvement and adaptation to new lines of work, they have revolutionized certain industries, and made possible successful operations on an enormous scale.

In gold placer mining, or for all kinds of dry land mining, the giant portable steam shovels have completely displaced old methods of reaching the ore, and at the same time made it profitable to handle low-grade ore at a profit. Low-grade ore mining has in recent years excited a good deal of rival interest. The vast amount of this ore which can easily be reached has appealed to those who see great possibilities in small profits when business is conducted on a huge scale. The invention of modern methods of extracting the metals from this low-grade ore has stimulated industries, but it is hardly conceivable that a profit could have been made without the modern steam shovels. In placer mining the gold-bearing earth is often covered over with a layer of gravel that must first be removed. To remove it by hand is a slow and toilsome process, and often renders gold mining of this character unprofitable.

In other kinds of mining the steam shovels of great capacity have also proven their worth. The 95-ton shovels have a capacity of five cubic yards of earth at each dip, and with such a shovel working continually for a day some 2,500 to 4,000 cubic yards can be removed. In the iron ore mines of the Northwest steam shovels of much less capacity than the 95-ton implements have removed 200,000 and 300,000 tons of ore without a break or interruption for repairs. These enormous ore shovels are adapted to mining under different conditions. They are portable and easily manipulated, working in the mines under conditions that make ordinary handling of the ore unprofitable. They are operated by independent reversible engines, with steam supplied from locomotive boilers instead of the old vertical, submerged flue type of boiler.

The cost of handling low-grade ore determines the profits of the company, and unless its first manipulation can be made cheap subsequent handling by machinery counts for little. Steam shovels working in the Minnesota mines have handled hundreds of thousands of tons of iron ore at the low cost of 2.5 cents per ton, including the cost of repairs to the machinery. If this latter is deducted the average for a season has been a trifle over 2 cents per ton. With ore handled at such low cost, there is abundant room for profits in the very low-grade ore mines.

The steam shovel found its first field of operation in general excavation for railroads, canals, tunnels, and contracting work of a general nature, and it is natural that its greatest improvement should be along these lines. For mining purposes, the steam shovel was adapted much later in its history. In railroad construction work, the steam shovel has reached its highest development. Railroad building in this country could not be carried on so successfully without the improved machinery for excavation. In no other country have there been demanded such powerful steam shovels for railroad construction as in the West, and the record of their work is phenomenal. There are famous cuts in the great Western roads which were excavated entirely by two or three powerful steam shovels, and on the line of the Union Pacific railroad millions of cubic yards of earth were removed within a single year. Railroad tunneling has been made by steam shovels almost equally successful. The great Sherman Hill tunnel in Eastern Wyoming on the Union Pacific was the result of three powerful steam shovels built for this particular piece of work. The ordinary steam shovel has too large a boom to work in a railroad tunnel, and in the case of the Sherman Hill tunnel the booms had to be shortened. After the completion of these shovels the amount of excavation was nearly doubled per month, and the work was finished months ahead of the contract time.

The use of steam shovels for canal building has been the most noteworthy of their accomplishments within recent years, and their greatest records have been made at Massena, the Chicago drainage canal, and at the Soulanges canal. Attention is called to the new types of shovels for canal building because of the renewed interest in the Erie and Panama canals. The widening and deepening of the former will require the heaviest and most powerful of modern steam shovels, while the completion of the Panama canal by Americans will call for special types of steam shovels of gigantic size. When the De Lesseps Co. worked on the Panama canal, the 35-ton shovel was about the largest in use. In this old-style shovel the width of the cut was about 48 feet, and the steel car that formed a foundation for the shovel was about 30 feet in length. The capacity of the 35-ton shovel was one and a half cubic yards. In place of these small shovels the new Panama excavators are likely to put at work the 95-ton shovels, with the width of their cut extended to 55 and 60 feet, mounted on steel cars 40 to 50 feet long, and with a capacity of 5 cubic yards. The difference between the two types is so great that there is little wonder that engineers can figure on quicker and cheaper work in finishing the canal.

On the series of canals opening up the St. Lawrence, steam shovels made records in excavation that show the great efficiency of the powerful machines in any kind of a soil. One of the machines excavated over 30,000 yards of hard pan and bowlders and some 600,000 cubic yards of blue clay. Usually dynamite is found necessary in excavating through such rocky soil, but the steam shovels proved equal to the task without the employment of explosives. In digging the Chicago drainage canal the largest types of shovels were not used. The 65-ton shovels were those most used, and they accomplished results that indicated the value of the machines in rough, rocky soil. A good deal of the work done was through the very worst kind of rocks, which called for unusual skill in excavation. The shovels proved their efficiency so well that in subsequent canal digging blasting is resorted to only where solid rocks impede the way. The breakdowns and damages from handling such rocky soil were so few in all of these enterprises that expenses were increased very slightly. In the early use of steam shovels the repair bills always formed such an important item that work of a particularly difficult nature was undertaken with some doubt about the results.

Steam shovels especially adapted to the excavation of sewers have been in operation in the past year with great success. By means of this sewer construction has been greatly simplified and cheapened. The specially-designed shovel for this purpose includes a dipper with the widest part at the cutting edge, and mounted on heavy cross-beams and rollers with a handle so long that a trench 12 feet in width and 20 feet deep can readily be excavated. The time required to dig a sewer by this machine has been reduced almost one half, and the cost fully 20 percent. An ordinary operator of a steam shovel can perform the work more accurately than twenty men armed with shovels or the old-type of excavating tools.

The portability of the steam shovel constitutes an important part of its usefulness. In railroad construction work this is easily arranged by mounting the shovel on a steel car that runs on the ordinary gauge road. The shovel is then arranged to work sideways or directly in front. In laying new tracks or in improving new lines, the shovel scoops up the earth to the desired depth, and permits the workmen to lay the ties and fill in rapidly for the rail-layers. The work of constructing or repairing the track by this means is rendered so effective that traffic is only slightly interrupted on trunk lines in taking up and relaying rails.

The construction of the modern giant excavating shovels is of the best, and every pound of steel put in them is severely tested beforehand. This is essential when we consider that the pull on the dipper of a 95-ton shovel is considerably over 115,000 pounds with a working steam pressure of 100 pounds to the square inch. The chains in particular must be of the finest and strongest steel, for the efficiency of the machine depends entirely upon the power of these chains to make the pull and thrust. The chains are tested to stand twice the pull of the ordinary full load, and they are furthermore subjected to unusual tests to discover any flaws in the metal. Ordinary steel chains would not stand either the test or strain that steam shovels impose upon them. The chains vary in size from half an inch to two inches.

THE SELECTION OF MOLDING SAND.

H. S. Vrooman, of Chicago, makes the following observations on a subject of interest to foundrymen:

"In the selection of a molding sand there is no rule that can be laid down for the selection of sand for a particular grade of work, as all foundries differ some in their operation and practice. A sand that suits one foreman another can not use or would not have. This is not a difference in ability, but in conditions. A sand used in different shops under like conditions will give like results, but under different conditions will not give like results. Every practical man in the foundry business has his ideal in a molding sand, although he is seldom able to obtain it. We frequently hear certain sands spoken of as being the best sand on earth. Yet, if a visit could be paid to the foundries located in the district that this sand comes from, you would find the usual conditions, i. e., an occasional scab or draw-down, and if the books could be seen, the percentage of loss would be the same as elsewhere. These losses will occur in the best shops, with the best of molding sand. The only thing that can be done is to keep them down to a minimum, which can be done with a sand suitable for your work. In ordering sand, allowance must be made for variation, as it is hardly possible you will receive any two shipments that are exactly alike. This variation is due to the way sand lays in the pit. Sand deposits, in most cases, are but pockets, being washed in at some time by a flood or overflow, and are usually found in the vicinity of streams or bodies of water. Some deposits contain two and even three grades of sand. These are all mixed together as a whole and shipped, unless the different grades are so separated that they can be mined separately.

"Molding sand is really manufactured at the pit, and it is the ability of the shipper in the manipulation of the sand to put it on the market to suit his customers, and a shipper that understands his business will be able to deliver regularly a good average grade of sand. The time of the year at which sand is dug will make a difference in the quality. A sand digs best when it is of a temper to work, containing just enough water to mix well and soften up easily. Wet sand will not mix well, as the alumina rolls down and sticks together, neither is sand that is dug dry good, as the alumina is dried up in lumps and can not be broken. If it were possible to dig sand and allow it to weather out over winter and ship it the following season, it would be of much more uniform quality. The expense attached to this method of loading sand would increase the cost too much and the foundries would not want to pay the difference. Not being able to lay down a rule for the selection of a sand for different grades of work, owing to the different conditions under which it is used, the question then arises: What is a good molding sand? What kind of sand shall be selected and how shall this selection be made? To begin with, a good molding sand will resist the pressure of the liquid metal, give free escape to the gases, separate easily from the castings when cool, leaving a clean smooth surface. To fill the first requirement, the sand must contain sufficient alumina or bond to resist the pressure of the liquid metal. This must be kept within reason or it will not permit the free escape of the gases. The amount must be determined by experiment. Railroad work will burn out sand faster than agricultural castings and will require a sand higher in alumina, etc. All sand will burn out or lose its plastic nature at a red heat and to the extent that a sand becomes red-hot from the face of the mold, to that depth will it burn out and become a loss and to that amount must be renewed; and while on that point it might be well to say that a sand heap should have a little new sand every day. The theory held by some that the new sand that is put into the facing sand is enough to keep the heap in good condition is wrong. There is nothing as hard on sand as sea coal. This facing sand is all brought in contact with the melted iron and if it does not burn out from contact with the casting it is burned out from the sea coal taking fire and the passage of gases through the pores left open by burning out of the coal.

The renewal of a sand heap is a thing which should be looked after carefully, as many losses that are laid to the sand are the result of rotten sand heaps. This renewal should not be left to the men, but should be seen to by the foreman, and the proper amount of new sand put into the heaps every day. The more open a sand is the easier it will separate from the castings. To secure a smooth face use as fine a sand as you can without it burning on to the face of the castings. It is advisable to use as open a sand as you can without it cutting, as an open sand will carry more water, which will aid in giving better lifts and clean draws. You can ram it harder, which will keep the casting down to weight, and it will vent easier. In making a test of a sand a thorough trial should be given, and when failure is met with an analysis of the causes as well as the composition should be made and the exact fault located. It may be found under careful scrutiny that a sand you would condemn offhand may be used to advantage when it is thoroughly understood. In making the analyses of sands, three determinations are all that are necessary—(1) alumina, (2) free silica, (3) loss on ignition. The alumina denotes the strength or wearing qualities, free silica the openness or porosity, the loss upon ignition the water of crystallization and vegetable matter. To this might be added a determination for iron; sand that is very red in color will analyze high in iron. Iron adds a further bond to the sand in addition to the alumina, without closing up the pores. Impurities, such as lime and magnesia, as a rule do not exist in sufficient quantities to do any harm, and can be ignored.

"After you have decided on about the grade of sand you want to use, you may then have trouble in finding what you want. The next move is for you to buy two or more grades of sand and blend them. This is the only solution of the molding sand problem and the one way for the foundry men to get good sand and one containing the proper percentage of the different elements. By this method a coarse sand can be made finer by the addition of fine sand, and a fine sand can be made coarse by adding coarse sand, etc. Your percentage of alumina can be increased or decreased at will by adding open or strong sand in proportions to suit your work. By blending I do not mean to buy two or three grades of sand and put them all in one bin or shed, or put them in different sheds and allow the molder to dig into them at will. These sands should be bought differing in composition and structure to the extent that they may be used separately on some of your work and when mixed together will give you a sand that you can use generally. The blending process should be done with a mechanical mixer, a machine that every foundry should have. This should not be a machine that will throw the sand out as fast as it is put into it, but a machine that will mix it thoroughly. Care should be taken in mixing and the proper proportions used. Mix by measure and not by weight, as one sand may contain more water than the other and would weigh more. Should your sand go back on you for any reason in the blending process, you have the means at hand by which you can remedy the trouble at once. You do this in your mixture of iron, why not in sand? Local sands are not always suitable for local work, but by the blending process an inferior local sand can be built up by mixing with it a good foreign sand."

In the unloading of the steamer Wolvin at Conneaut, O., July 25, referred to last week, the four Hulett machines took out 7,257 tons, an average of 1,814 tons each, and their average time was four hours and six minutes. The four Brown electric machines unloaded 2,688 tons, an average of 672 tons, the average time being three hours and forty-one minutes. The largest tonnage unloaded by any one machine was 680 tons in an hour by the No. 3 Hulett. The actual time of the vessel under the machinery was four hours and thirty minutes. Fifty men were employed in shoveling during the last hour in which the vessel was under the machinery.

HIGH TEMPERATURE MEASUREMENTS—II.

BY S. H. STUPAKOFF.

We have our standards for measuring time, lengths and weights, and likewise we have standards for measuring temperatures. From among a number of themometric scales which have been proposed at various times, the Fahrenheit, the Reaumur and the Celsius or Centigrade scales are the ones which have outlived all others, and these at the present date are the recognized standards in various part of the world. We are most familiar with the Fahrenheit scale, which is the one adopted in the United States and England for all ordinary purposes. The Centigrade scale is mostly used for scientific

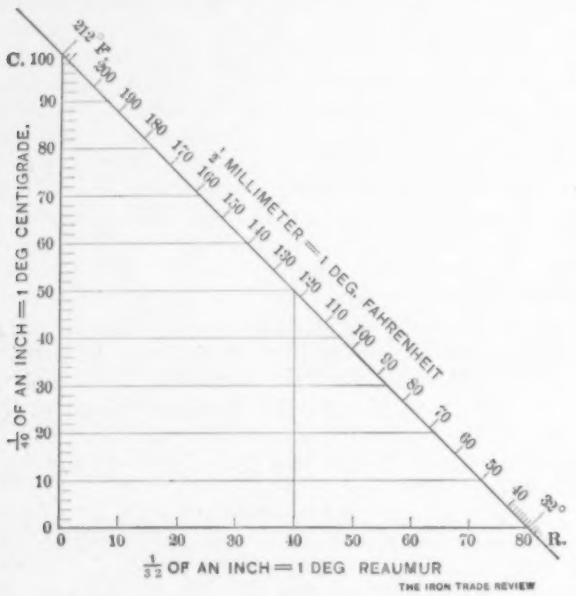


FIG. 1.—RELATION BETWEEN FAHRENHEIT, CENTIGRADE AND REAUMUR SCALES.

purposes the world over, besides being the standard in all Latin countries, and the Reaumur is used principally in Germany and Russia.

It is very peculiar that the United States and the British nation should have made as their choice a scale which was proposed by a German; the Germans one which was invented by a Frenchman, and the French another one which was devised by a Swede—an excellent illustration of the saying that "a prophet is not without honor save in his own country." The three scientists named were contemporaries at the beginning of the eighteenth century.

Fahrenheit was born at Danzig in 1686. He conceived the idea in 1714, of substituting mercury for spirits of wine in the construction of thermometers. He commenced his divisions at the lowest temperature which he had observed at his home in 1709 by mixing snow and sal-ammoniac. The space between this point and that to which the mercury rose at the temperature of boiling water he divided into 212 parts, which gave us our present Fahrenheit scale with 180 divisions or degrees between the freezing and boiling points of water.

Reaumur, the son of a French nobleman, born in 1683, was a genius of remarkably wide attainments, with the rare record of being elected a member of the Academy of Sciences at Paris at the age of 24. In 1731 he became greatly interested in meteorology and invented the thermometer which bears his name. The scale of his instrument was divided into 80 equal parts between the freezing and boiling points of water, and his zero was selected at the freezing point.

Celsius was born at Upsala in Sweden in 1701 where he became professor of astronomy. He participated in the famous Maupertius expedition for measuring a degree of the meridian in Lapland. As he died in 1744, the date at which he proposed the Centigrade scale must have been very nearly the same as those of the other two mentioned. This scale, which is also known after his name as the Celsius scale,

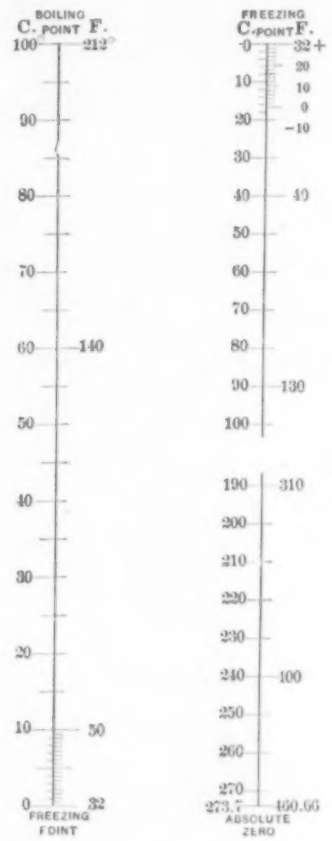


FIG. 2.—RELATION BETWEEN CENTIGRADE AND FAHRENHEIT SCALE FROM ABSOLUTE ZERO TO BOILING POINT.

commences at the freezing point of water with zero, and its boiling point lies at 100°, with 100 equal divisions between them.

The relation of these three scales is somewhat complicated, as the zero of the Centigrade and Reaumur falls at the 32d division of the Fahrenheit. This requires that the intervals of temperature should be subjected to an addition of 32° when it is desired to convert the latter into one of the former scales,

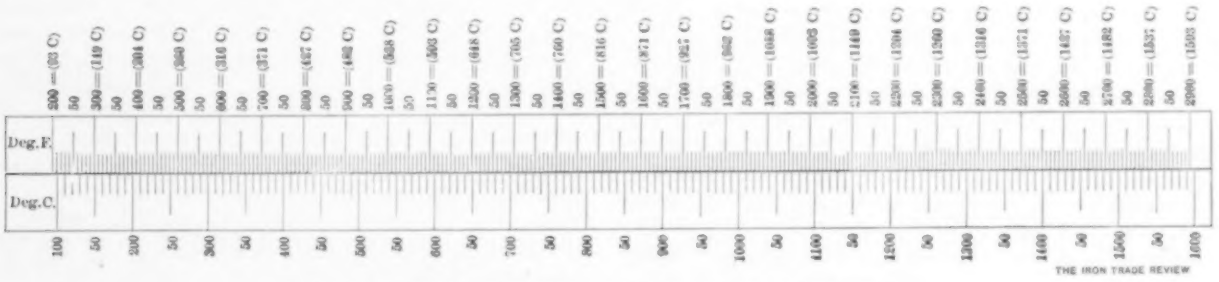


FIG. 3.—COMPARATIVE SCALE, CENTIGRADE AND FAHRENHEIT.

and to a subtraction of the same number in the reverse case. The space from the freezing to the boiling points represents 180 divisions on the Fahrenheit scale, 100 divisions on the Centigrade scale, and 80 divisions on the Reaumur scale. Accordingly

$$1° C = \tfrac{4}{5}° R \text{ and } = \tfrac{9}{5}° F$$
$$1° R = \tfrac{5}{4}° C \text{ and } = \tfrac{9}{4}° R$$
$$1° F = \tfrac{5}{9}° C \text{ and } = \tfrac{4}{9}° R$$

To convert the Reaumur scale into the Celsius scale it is merely necessary to multiply by $\frac{5}{4}$ and to convert the Celsius into the Reaumur to multiply by $\frac{4}{5}$. But to convert a certain

number of degrees Fahrenheit into Centigrades or degrees Reaumur, 32 must be first subtracted, in order that both scales may commence at the same place. It then remains to multiply by 5-9 or by 4-9, as the case may be, to obtain the desired equivalent. Should it be required to convert Centigrades or degrees Reaumur into their equivalent on the Fahrenheit scale, the process of calculation is simply reversed by first multiplying by 9-5 or 9-4 and then adding 32.

The formula used for the conversion of these three scales are as follows:

$$C = (F-32)\ \tfrac{5}{9}$$

and inversely $F = \tfrac{9}{5}\ C + 32$, or $1.8\ C + 32 = F$

For converting Reaumur into Fahrenheit, we have

$$F = \tfrac{9}{4}\ R + 32$$

and for changing Fahrenheit into Reaumur,

$$R = (F - 32)\ \tfrac{4}{9}$$

For changing degrees Reaumur into degrees Celsius we use

$$C = \tfrac{5}{4}\ R$$

and for converting Centigrade into degrees Reaumur

$$R = \tfrac{4}{5}\ C$$

An easy method of converting Centigrades into degrees Fahrenheit is to multiply by 2 and subtract therefrom 10 percent less 32. For example:

720° C = 1440

— (144 — 32) 112

1328° F

or

1440
— 144
1296
+ 32
1328° F

And similarly, to convert degrees Fahrenheit into degrees Celsius: Subtract 32, add to the remainder 1-9 and divide by 2. Thus:

From 212° F. subtract 32, giving 180. Add 1-9 or 20 and we have 200. Divide by 2 and we have 100°, the corresponding centigrade. Or, starting with 1328° F., subtracting 32 gives 1296. Adding 1-9, or 144, gives 1440; dividing by 2 gives 720° C.

With a little practice either one of these calculations can be executed quickly without the use of paper and pencil, and without reference to tables which were calculated for the purpose. The relation between the Centigrade, the Reaumur and the Fahrenheit scales is conveniently demonstrated in graphical manner by an isoceles triangle. (See Fig. 1.) If the cathodes be made each 5 inches long, and if one of them is divided into 100 parts and the other one into 80 parts, then an inch scale with 20 divisions to the inch will give the measure of 1° C. on the former for each of its 1-20 divisions, whereas a scale with 1-16 division will give in the same manner a direct reading of the Reaumur scale on the latter side which is divided into 80 parts. In Fig. 1 we have reduced the above scale one-half, 1° C. being 1-40 in. and 1° R. being 1-32 in. Then use a metric scale on the hypothenuse of the triangle, and if both the Centigrade and the Reaumur scale commence with zero, shift this metric scale 32 millimeters beyond the base of the triangle, and you will have a direct reading scale for degrees Fahrenheit, which are equivalent to points on both the Centigrade and Reaumur scales, intersecting either the one or the other as ordinates or abscissæ respectively.

Figs. 2 and 3 show a set of comparative Centigrade and Fahrenheit scales for ranges of temperatures from the absolute zero up to 1,600° C. or 2912 F. The division of the Centigrade scale is based upon the temperature of steam under a barometric pressure of 760 mm. or 29.92 inches of mercury, reduced to the freezing point of water 60 meters above sea level at the latitude of Paris (48° 50′).

The boiling point of the Fahrenheit scale is supposed to represent at London the temperature of steam at a pressure of 29.905 in. of mercury reduced to the freezing point of water.

There exists, accordingly, a slight difference between the two scales, since a column of 29.922 in. of mercury at 0° C. at Paris is equal to 29.914 in. at 32° F. at Greenwich near London (51° 28′).

But the error is negligible, as a difference of .059 in. in the length of the barometric column, i. e. a change from 29.905 in. to 29.964 in. would change the boiling point but 1-10° F. or raise it to 212.1° F.; and at this rate the actual variation of the two standards of our thermometric scales amounts to but .015° F.

The importance of the influence of the atmospheric pressure upon the stability of the boiling point of water is more forcibly illustrated by comparing our standards with the same critical points for high altitudes, where with the reduction of atmospheric pressure, the boiling point is at the same time reduced. For example, Prof. Tyndall has observed water to boil at 85° C. (185° F.) on the top of Mont Blanc, which is 15,780 feet high. Approximately, the boiling point of water drops 1° F. for every 590 feet elevation. Therefore, on top of the Aconcagua, the highest mountain in the Southern Andes, water would boil at 171° F., and on the Mount Everest of the Himalaya mountains at 162° F., all other conditions being equal.

We may add that water may be made to boil under the receiver of an air pump at a much lower temperature, and on the other hand, under increased pressure, as in any inclosed space or vessel, it boils at a much higher temperature.

NEW COMMISSIONER OF THE N. M. T. A.

William P. Eagan, the new commissioner of the National Metal Trades Association, was formerly general manager of the F. W. Wolf Co., Chicago, manufacturer of

W. P. EAGAN.

ice and refrigerating machinery. He went with this concern in October, 1899, as manager of its credit department, and has been with the firm continuously since. Mr. Eagan is 31 years old, and was born in Cleveland, O., where he worked for some years before going to Chicago. He was active in the organization of the Chicago Metal Trades Association, and for the past three years has been on the administrative council of the National Metal Trades Association.

The Pennsylvania Steel Co. has ordered its second Lebanon furnace to be put in blast at once. The furnace has been idle for several months.

The Vandyck-Churchill Co., New York, has been incorporated to take over the business of the J. R. Vandyck Co. There will be no further change in the affairs of the concern.

The Zenith Furnace Co., Duluth, Minn., has blown in its stack after making extensive repairs and additions to the plant.

THE CHANCE OF THE CAPABLE SHOP MAN.

BY E. O. PALMER.

It is somewhat amusing to many among the ranks to hear and to read of our captains of industry lying awake nights and using a great deal of time otherwise, looking for capable men for responsible positions. There are no doubt many positions that require exceptional ability, which are hard to fill. There are again many more positions for which there are young men entirely competent and worthy, who could fill them, and these young men are "right under our noses," as it were, but we have not made it a point to know them nor to recognize or assist them in the proper way. It is quite common and natural to judge a young man by some action or show of lack of self-confidence which occurred in his boyhood. There is also another thing that in many cases has considerable bearing; that is a portion of scripture relative to the prophet in his own land not being recognized. How true this is and how many times boys have become employes of an industry and as they became older perhaps their wages increased; at the same time they have never been given credit with any power of observation or any ambitious thought and when a vacancy occurs we must look to some outside source to fill the need; none of our employes are capable.

How do we know that they are not capable? Have we sized up our young men thoughtfully or made anv inquiries as to their occupation outside of business hours. Are they making any efforts at self-education or associating themselves with men of superior knowledge or are they of the class mentioned in a recent issue of *The Iron Trade Review*, who are waiting for the whistle and payday and spending their evenings at some place of recreation? Presumably the latter, because Mr. ————, my chief clerk, mentioned the fact a few days ago that Johnnie had been caught asleep at his desk after being out the night before to a ball. Mr. ————'s estimate is usually sufficient; there is no need of any further thought of Johnnie for promotion. We have forgotten the time when we were young and anxious to be popular. This is a homely illustration but instances in similar or varied form are of constant occurrence.

Mr. W. L. Kellogg, in a recent paper read before the Pacific Railroad Club said: "He who realizes possibilities and acts on this realization will ultimately become a leader." This statement is pleasing to the young and ambitious mechanic. He knows from this, that if he is attentive to business he may be able to see where an improvement can be made in management or methods and that his srvices will be appreciated and he will be given due credit for his efforts and initiative. Alas, there is an awakening. The young man pays a visit to some shop, perhaps one in his immediate neighborhood but under different management, and we will take for an instance that he sees a machinist planing rod brasses on an improved shaper. He is observing, notices the fast speed and much faster return stroke and wonders why his foreman in the shop where he has worked nearly all of the time since he became a machinist, had never thought of using this shaper instead of the planer for this work. He now remembers that there is a shaper nearly new in his shop of which one head is never used and in fact the belt is off the line shaft pulley, his foreman having decided to have this belt removed to save wear of countershaft. He goes to work the following morning in fine spirits, in fact inwardly rejoicing that he can suggest something which may possibly attract his superior's attention to himself and place him in higher esteem than his less ambitious brother. He is impatient and restless until an opportunity comes to mention the subject to his foreman. Finally the opportunity arrives and he tells of his observations and makes his suggestion. The foreman informs him quickly, very quickly, that when his employer wishes him to suggest methods he will receive due notice; in the meantiem he will please be more attentive to his own occupation than to that of others. No, this is not a true description; we have no foreman in our employ of that narrow-mindedness. We have none of the following class either. This foreman (of another class) listens to the description, inquires as to details and planes a few pairs of brasses on the shaper, sees the benefit and continues to machine them there. After the idea has been thoroughly tried and demonstrated he calls the attention of the master mechanic to the new method, describes the operation and the saving in cost and perhaps receives congratulations from his superior, although ten to one he doesn't. What about the young man who made the original suggestion? "Never heard of him." "How long has he worked here?" "All right, give him his time," or "There are many more better men than he looking for a job every day," etc., etc. This is one of our cantains who is lying awake nights trying to think of some one to fill a semi-responsible position in the mechanical department of his works.

It has been said that we have no foreman in our employ of the above mentioned types. Yes, you have, and they form 99 percent of the entire number.

The young mechanic mentioned should have gone directly to his master mechanic and made his suggestion. Before we censure him for this oversight let us learn more of the master mechanic. Is he well met? Will he listen? Will he be thankful for a suggestion or would he dismiss the subject gently and thank the young man? Here is another 99 percent of the negative quality. No doubt many can call to mind this percentage and some with a large experience will discover the truth of this statement. And of "similar and varied" instances, a volume could not contain them. As an actual illustration taken from life I must tell you of a "like instance," which happened in one of the principal shops of a leading trunk line railroad. It is relative to the boring of crank pin holes in new driving wheels. It had been customary in this shop to bore them on a radial drill press by the use of a boring bar with a suitable guide at bottom of bar. The operator of this machine was able to bore two of these wheels per day. Finally another radial press was received and it became necessary to place this operator on the new machine, replacing him with a man not accustomed to radial drills. This new man was unable to bore more than one wheel per day. This was one of the "humane" railroads. There was some sort of an agreement with a labor organization which provided for the promotion of its members and this man was allowed to remain on his new job. The foreman of the department doing this work, appreciating the circumstances, concluded that he would try another way which he believed was original with himself at the time, but discovered his error later. There was a 72-inch boring mill in the shop which was not busy the entire time and the drills were very busy all of the time. He came to the conclusion that he would bore these pin holes on this mill. Even if the product was only one per day, the relief given to the drills would help considerably. This foreman was not of either of the above mentioned classes, but was of the one percent. He talked the matter over with the man operating the boring mill and they both suggested and received suggestions from each other as to the best method of clamping, kind of tool to use, etc. This man was anxious to please the "one percent" and started off the first and only day by turning out three wheels. Close upon the completion of the third wheel, the foreman was informed by the general foreman that this method must be discontinued, as the strain and wear on the machine was too great. This reason was as thin as tissue and the cause of interference plain. The foreman was not satisfied that his supposed original method was altogether wrong and made inquiries of the manufacturers of this mill, describing the method and asking their opinion. They informed him that he was entirely right and furnished photograph of mill with special attachment for this class of work. It is needless to say that this foreman, who was a young man, observing and studious, resigned his position. This was apparently his only salvation, as he did not wish to be upon exhibition as an antiquity.

We have another thing which obstructs the capable man in his career. At some period during our existence as an

employer, we have had a labor difficulty, a strike perhaps. There were a few men who remained loyal and refused to be influenced by a labor organization, some one of its its leaders possibly having been convicted of "grafting." These loyal men were good men in their respective occupations, which may have been that which required skill or otherwise, but were utterly lacking in that power of handling men and of executive ability. The difficulty is finally settled, the men go back to work. Soon a vacancy occurs in the managing staff. We conclude that our loyal men are entitled to reward and promote one of them. Because we believe him capable? No, because we wish to vent our spite on the majority of our workmen and insinuate to them that they must be loyal to obtain anything above manual labor. The man we promoted is deficient in education or lacking of observation or entirely without executive ability; perhaps all of these. Nevertheless he gets the position and we lose dollars every minute he is in charge and are open to the righteous ridicule of our employes. We will say nothing of the contentedness of these employes. There is machinist Jones who is possessed of all of the required qualifications. Can't use him because he is identified with a labor organization. We have not become educated to the fact as yet that a member of one of these organizations can produce results regardless of his connection. We will in time.

In Mr. Bement's recent paper entitled "The Influence of Brain Power on History," he said: "It is necessary for the corporation, like the nation or individual, to be a student." This is not possible at the present time until we gain further education regarding this idea and act on it. The student technically learns his instructor's methods, imitates him and always uses this instruction in after years as being authentic and reliable. The corporation usually will not accept or receive instruction, as it were, from another corporation in a like business. It would seemingly detract from their own ingenuity and prestige. They prefer to act upon and adopt some idea entirely original with themselves.

As an illustration I will cite an instance in which I was personally interested. A young man employed in the mechanical department of a railroad, while traveling over the road as his duties called him, had numerous opportunities of visiting manufactories and railroad shops. Upon one of these visits he saw a very neat apparatus for setting locomotive tires. It was compactly built and nicely mounted upon wheels and easy for one man to convey it to any part of the shop. Upon his return to his home shop he made a sketch of the device and presented it to his foreman, explained the details and cost of operation. It was considered by his foreman to be a very economical and handy tool, but we must not construct one exactly like this one; it must be better and different. As the required construction developed, the apparatus was the same in every detail as that of the "educator," except instead of being mounted it was provided with two handles, one upon each side, and it was necessary for two men to handle instead of one. The machine was satisfactory to those in charge because it showed one detail of home originality. This, Mr. Editor, is a fair example of the manner in which the corporation will become a student.

In the same paper Mr. Bement mentions the need of the professional student, but admits that there are difficulties in the way of this scheme. He is indeed right, especially regarding railroad work. This professional student, he says, should be unhampered with routine duties and should work with the assistance and co-operation of all employes. The last is impossible at present for the reasons given above. The student would survive during the administration of the instigator, but upon the incoming of a new master mechanic, I fear his term of office would not be a sinecure, because at this time the railroad would not have money to pay a man for doing nothing, apparently—that is, a man not contributing directly to current earnings.

The rod mill of the American Steel & Wire Co., Newburg, Cleveland, has resumed operations and is running to its full capacity.

Progress in Railroad Bridge Building.*

BY F. C. M'MATH.

It is probably safe to say that nowhere in the world has the art of bridge building progressed faster than in the United States. Previous to 1860 practically all of our truss bridges were of timber construction—mainly of the Howe truss type. About this date the building of spans with cast-iron compression members and wrought-iron tension members became the fashion, and a few metal bridge building establishments sprang up; each concern usually adhering to some particular type of construction, such as the Fink truss or Bollman truss. It may interest the members of the society to know that the old Detroit Bridge and Iron Works was one of these pioneer companies and built bridges under the Bollman patents. Metal bridges were something of a luxury in those days, the old records of the Detroit Bridge and Iron Works showing prices from 8 to 10 cents per pound. Not many railroads could afford metal structures at such figures, and combination wood and iron bridges began to be largely used, especially by the railroads in the West.

About 1880, bridges constructed entirely of wrought iron began to be commonly used. Seven or eight years later, steel eyebars were substituted for wrought-iron tension members and about 1890 the iron compression members had to give way to those of steel.

The change from iron to steel was opposed by many engineers, but steel won the day on account of its lower cost.

During the period of change in the materials of bridging, a very great change took place in the weight of rolling stock. In 1860 an ordinary locomotive and tender would weight about 40 tons; in 1880 a 66-ton engine was thought a monster. In 1890 engines of 100 tons were believed to be about the limit, but now there are plenty of engines weighing, with tender, 140 to 150 tons. These radical increases in loads naturally have had a marked effect on the bridge building industry. A bridge built for the loads of 1860 needed renewal about 1880, and structures designed for 1880 conditions had to come out before 1890. This is an understatement rather than an exaggeration. I know of one structure in Michigan that has been renewed no less than three times by one company. It is doubtful whether the limit in loads has yet been reached, but this is a matter for the railroad engineers to worry about; not for the bridge builder to lose sleep over.

Pin-connected spans have been the favorite type in the United States from the earliest days of metal bridge building. Some years ago quite a controversy arose between American and English engineers as to the relative merits of pin and riveted spans, the latter being the distinctly English type. American engineers apparently had the best of the argument, the pin structures being unquestionably lighter in weight and cheaper to erect. In recent years, however, a strong tendency has set in toward the use of riveted structures for spans of short or moderate length. Most bridge engineers would not now use pin designs for spans less than 125 feet; and a few railroads, such as the New York Central Railroad, have practically cut out pin bridges altogether and are now making the riveted bridge their standard type. In Canada the riveted bridge has been in favor for some time by the leading railroad companies, being used quite generally for all spans up to 200 feet, whether single or double track.

There can now be no question that the English engineers were pretty much in the right in their old contention in favor of riveted bridges—at least for spans less than 200 feet, which cover the bulk of ordinary railroad structures. American engineers, however, have by no means copied English designs, even if they are coming around to the English type.

American designs use longer panels and much deeper trusses, and on this account our structures are lighter, stiffer, better and cheaper than the English. For some occult reason the English engineer feels that the slope of his diagonal truss members must be exactly 45 degrees, if possible, and that the depth of truss must not exceed one-eighth the span length. His adherence to these thumb rules makes his designs heavy and expensive, and, for short spans, often defective in their top chord bracing. They use difficult details, apparently taken

*An address delivered by the president of the Detroit Engineering Society at the tenth annual meeting.

from their shipbuilding practice, where probably there are good reasons for their use, for it must be admitted that they are masters of the art of shipbuilding.

During the past few years a marked improvement has been made in bridge floors. Timber floors are still in general use, but cross ties and guards are now much more substantial than formerly, and the space between the ties has been reduced from eight inches or more down to four inches. Some of the trunk lines are abandoning timber floors altogether, and are using solid metal floors carying gravel or rock ballast. These floors are exceedingly satisfactory in actual use, their great weight and rigidity reducing impact and vibration to a minumum. The only objection to such floors lies in their higher first cost and liability to deterioation by rust. The most common type of solid floor is the trough floor, but it is expensive and very difficult to protect against rust. It may interest the society to know that the cheapest and best type of solid floor is one designed by a member of this society. It is in general use on the Michigan Central railroad, and is being used to an increasing extent by other roads. A proper name for this type would be "the Douglas Solid Floor."

In the last two decades great progress has been made by the manufacturers of bridges. General methods and processes have shown no radical changes; but better system, more powerful machinery, pneumatic and electric handling devices, have reduced costs. Bridge shops have greatly increased in number and in capacity. Fifteen years ago no single concern had a capacity exceeding 2,000 tons of bridge work per month. This output at the present time is far exceeded by many shops, and there is now a single plant with an estimated monthly capacity of 20,000 tons. This is the new plant recently completed by the American Bridge Co. at Ambridge, near Pittsburg. Some idea of the scale of the concern will be gained when it is known that provision has been made in the office for upward of 500 draughtsmen. Single pieces weighing 80 tons can be made and handled in this shop. Eyebars 16 inches wide can be made in the forge department.

Structures can be built today that would have been impossible a few years ago. This is the day of big things in bridge building, as well as in other lines of work. More huge bridges are under way than ever before. A 671-foot cantilever span is being built over the Mississippi river, at Thebes, Ill. The Wabash railroad is about completing two huge cantilevers—one of 700 feet span over the Ohio, and one of 812 feet over the Monongahela river. At Quebec a cantilever span is being built over the St. Lawrence river, with a record-breaking span of 1,800 feet. At New York a 1,600-foot wire cable suspension bridge over the East river has been completed, and contracts have been let for a second bridge of cantilever construction, with a span of 1,182 feet. Plans are under way for a third bridge of 1,470 feet span, suspension type with eyebar cables.

In these last two structures, nickel-steel eyebars are to be used for the first time. The specifications for these bridges require full-sized annealed nickel-steel eyebars to have an ultimate tensile strength of not less than 85,000 pounds per square inch, whereas the minimum permitted for ordinary steel eyebars is only 56,000 pounds. It is thus apparent that the nickel-steel is about 50 percent stronger than the ordinary steel, a gain of enormous importance in bridge building. If nickel-steel can be supplied at reasonable figures, it will be widely used, especially in long spans.

The former head of the United States Steel Corporation, Mr. Schwab, is evidently a believer in the future of nickel-steel, as he has cornered the supply of nickel. His concern, the Orford Copper Co., is now arranging for the rolling of a quantity of nickel-steel plates and angles with a view to having bridge shops try them under the ordinary processes of construction. If no unforeseen difficulties are encountered, it should be feasible to use, in long spans, nickel-steel for compression members as well as for eyebars.

Progress in bridge building has certainly been of great magnitude in the past, but there is still plenty of opportunity for further development and improvement. Some of the advocates of concrete-steel are prophesying the substitution of concrete-steel in place of steel girders for short railroad bridges, but the metal bridge builders are not yet particularly worried over prospective loss of this business.

There is yet much to be done in the way of standardizing bridge specifications. Various opinions are still held by engineers regarding the quality of steel to be used, loads to be provided for, and permissible unit strains.

Prof. Heller, of the Ohio State University, has recently made an interesting comparison of railway bridge specifications. He made a detailed comparison of about 30 railroad specifications, and found a surprising lack of uniformity. Selecting a certain member of the bottom chord of a 134-foot span, he found, under a given loading, the total stress to be 270,000 pounds. Using the averages of unit stresses of 28 different specifications, he found 25.4 square inches of metal required to resist this strain. The area required by the lightest specification was 11.4 percent below the average, whereas the heaviest specification required 18.6 percent more area, the total variation thus amounting to 30 percent. He made similar calculations for the stringers of the same span, and found a total variation of 55 percent from the average.

Bridge designing is supposed to be one of the exact sciences, but it is very evident that there is no reason for bridge engineers to brag of exactness when their opinions of unit stresses vary to the extent shown above. It is to be hoped that, at some not very distant day, they will get together and adopt a standard specification. Strong efforts are now being made in this direction, and it is the devout wish of the bridge builder that they may be successful.—[Journal of Association of Engineering Societies.

TRADE PUBLICATIONS.

The Blaisdell Machinery Co. of Bradford, Pa., describes a line of self-oiling air compressors in Bulletin No. 12. The frames of these air compressors are entirely enclosed, allowing the crosshead pin, slides, main bearings and crank pins to run in a bath of oil. The oil supply is fed copiously to the parts by the crank discs as they rotate in the oil chamber. The oil feed to all the parts is positive and the lubrication starts and stops with the machine. The oil after being used, drains back to the chamber, and around this is cast a rib which the oil must overflow in order to re-enter the chamber, and in this manner any sediment is deposited outside the rib where it may be drawn off. Any drip from the front stuffing box enters, and may be drawn off from a separate chamber which prevents it from entering the oil reservoir. The machines are freely illustrated in detail with a number of good half tones.

Three pamphlets from the Wm. Tod Co. of Youngstown, O., treat respectively of the Tod Corliss engine, the plant and manufacturing facilities and the parallel operation of alternators from the engine builder's point of view. The latter paper was prepared by W. Trinks, M. E., engineer of the Wm. Tod Co., and was read before the Engineers' Society of Western Pennsylvania. All three papers are highly interesting as descriptive of the plant and product, as well as of the intricate study of the successful operation of direct coupled, alternating current machinery. In regard to the last mentioned subject it must be conceded that a simple presentation has been made of a topic which could easily have been treated with less light. The several pamphlets are adequately illustrated.

Bulletin No. 3 deals with the electric motors designed and built by the Browning Engineering Co. of Cleveland. These are direct current enclosed type motors, and are especially noticeable for the slow speed at which they may be run. With speeds ranging from 425 revolutions per minute in the 25-h. p. to 875 revolutions in the 2 h. p. they may be belted or geared to slow speed machinery with but few intermediate parts and therefore at small expense. The same frames as are used with the slow speed motors are also furnished if desired with higher speeds of armatures, the motors then have correspondingly larger outputs. The company asserts that for over a year not a single machine has been returned for repairs and that not a single burn out or serious defect of any description has developed. These motors are made in numerous sizes.

The "Century" rubber belt conveyor is made exclusively by the Jeffrey Mfg. Co. of Columbus, O., and is described in catalogue No. 67 A. The belting is made of a special high grade duck, which is overlaid with rubber of a suitable composition to withstand the abrasion of the material han-

dled. The carrying surface of the belt is reinforced by an extra covering of rubber, usually 1-16 to ⅛ inch in thickness. The catalogue is crowded with engravings showing the conveyors transporting barrels, boxes, etc., as well as material in bulk, coal, ore, and refuse of various kinds.

R. D. Wood & Co. of Philadelphia, in a recent publication illustrates a four-lift gas holder and steel tank of 5,000,000 cubic feet capacity and 190 feet diameter by 260 feet high. Some description is also presented of "Mond" gas equipment with by-product recovery, pressure or suction installations, etc., of the firm's manufacture.

A binder has been received from the Gisholt Machine Co. of Madison, Wis., for holding the several leaflets and pamphlets issued from time to time relative to turret lathes, boring mills, etc. A number of these publications are also to hand with facts and figures pertaining to working conditions on these tools.

The W. E. Caldwell Co. of Louisville, Ky., builder of tanks and towers, has a new catalogue. The towers for the support of tanks are of four different types—two are steel, one is an all-wood structure, and the other a combined wood and iron tower. Considerable information is given in regard to tanks and the requisite material of which they should be made. The present catalogue is of the seventeenth annual edition and is one of an issue of a million copies. "A better idea of what this means may be gathered from the fact that a car load contains only two hundred and fifty thousand, so that the total number represents just four car lots. The postage alone on these books amounts to ten thousand dollars, and when the cost of the catalogues and envelopes and mailing is added, the total foots up to some twenty-five thousand dollars."

"Two Sides of a Story" is a folder from H. W. Johns-Manville Co. of New York, regarding "Mobilene," a sheet packing for gas and gasoline engines for stationary, marine or motor vehicle service. "Mobilene" is furnished in sheets 40 inches square or in rolls of the same width. It is 1-32 inch thick and weighs four pounds per square yard.

The small tool catalogue of the Baird Machinery Co. of Pittsburg, is a 6 x 9 cloth bound volume of 652 pages. It contains lists of all the better known shop appliances with many of not nearly so extensive a vogue. A comprehensive index guides the busy reader speedily to the desired tool, and the publication in extent and thoroughness is most commendable.

William Symington is the subject of the latest short story from Wyman & Gordon, of Worcester, Mass., and Cleveland. Mr. Goddard recounts the history of a struggling pioneer in steam engineering and briefly, but vividly, outlines his career. A leaflet enclosed with the biography illustrates the steam hammers, used by Wyman & Gordon for forging die-blocks, as well as the interior of the pickling building, which is a separate structure isolated from the other buildings.

The Wagner cold saw cutting off machines have been described in *The Iron Trade Review* and appear anew with details of the various sizes as now manufactured by the Diamond Drill & Machine Co., of Birdsboro, Pa. An automatic saw sharpener of the same make is also illustrated and is made in two sizes, No. 1 for saw blades 10 to 26 inches diameter and No. 2 for saw blades 18 to 40 inches diameter. Catalogue No. 26 is mainly devoted to the above, but the company also mentions briefly the manufacture of rolling mill machinery, hydraulic machinery, diamond prospecting drills, Jackson belt lacing machines, air furnace and cupola castings and open hearth steel castings.

The Ransom Mfg. Co., of Oshkosh, Wis., deals with disc grinders in a small pamplet. The interesting and trade bringing features of the several sizes of machines are dwelt upon in vigorous style and the field of the disc grinder exploited. The machines are clearly illustrated with all equipments.

The William Tod Co., Youngstown, O., has been awarded the contract for the erection of a 20,000,000-gallon pumping engine by the city of Milwaukee. The contract price was $74,000.

INDUSTRIAL SUMMARY.

[If you are in need of machinery of any description, please notify *The Iron Trade Review*, and we will put you in communication with our advertisers at once.]

New Buyers in the Market and Some of Their Wants:—

The Anglo-American Corporation, Brooklyn, N. Y., has been organized with a capital of $50,000 to manufacture iron, steel and metals. Directors are: A. C. Neeley, F. T. Neeley, New York; T. A. M. Stevenson, Bronxville.

The New England Steel Casting Co., Hyde Park, Mass., has been incorporated with a capital of $30,000. President, Eupene Edwards, Boston; treasurer, John W. Johnson, Boston; secretary, William Montgomery, Newton, Mass.

The Canadian Adjustable Bearing Co., Windsor, Ont., has been incorporated with a capital of $100,000 to manufacture adjustable bearings for steam and electric cars. President, J. F. Harrington, Detroit; vice president, Irving W. Durfee, Detroit; secretary and treasurer, F. H. McPherson, Windsor, Ont.

The Buckeye Engine & Foundry Co., Joliet, Ill., has been incorporated with a capital of $50,000. The company will deal in gas and gasoline engines, machines and maufacturers' tools. The stockholders are: Fred Bennitt, Peter Michels, George J. Buckeye, Jacob Buerlein and James A. Raymond.

The Ensign Foundry Co., Toledo, O., will purchase a jib crane, Root or Connersville blowers and possibly two more rattlers. The new foundry, now being constructed, will be 80 x 164 feet.

The Midland Mfg. Co., Tarkio, Mo., manufaceurer of agricultural implements, is in the market for drill presses and bull-dozer and planer for the new buildings now in process of construction.

The Champion Founding & Foundry Co., Burlington, Ia., will soon purchase equipment for its machine shop and foundry.

The Fox Mfg. Co., Louisville, Ky., has been incorporated to manufacture a patent tailor's flat iron. The incorporators are: Henry Clay Fox, Forest B. Alexander, Warren L. Slaby and Ernest Hardaway.

The Bay City Iron Works, Bay City, Texas, have been incorporated with a capital of $10,000. The incorporators are: R. B. Crockett, T. O. Crockett, S. E. Delary.

The O. K. Machine Works, Buffalo, N. Y., have been incorporated with a capital stock of $10,000. The directors are: Thomas M. Johnson, Hobart J. Bradstreet and Walter S. Richardson.

The U. S. Oil Extracting Machinery Co., Decatur, Ill., has been incorporated with a capital stock of $100,000 to manufacture machinery. The incorporators are: W. J. Wells, C. S. Neederham and L. F. Ostrander.

The Prospect Boiler Co., North Brunswick, N. J., has been incorporated to take over the business of the Prospect Boiler Co. of that city. Capital $100,000.

Charles Dietrick, managing director of large companies recently organized by Pittsburgers and others for the purpose of constructing railroads and developing mining properties in Nicaragua, will open an office in New York to facilitate the purchases of large quantities of equipment. For the present he is with H. A. Rogers, 19 John street, New York

The Lyons Metal Bound Shipping Crate Co. has been incorporated at Lyons, N. Y., for the manufacture of shipping crates and other wares. Capital $50,000. Incorporators and directors: A. H. Tower, Charles Fisher and F. D. Burgess, all of Lyons.

The Hofele Iron Works, New York, have been incorporated with a capital of $50,000 to manufacture iron, steel, etc. Incorporators and directors for the first year are: D. B. Spence, T. F. Fay, New York; L. McCormack, Irvington-on-Hudson, N. Y.

The Albany Forge Co., Colonie, N. Y., has been incorporated with a capital of $80,000. The directors are: M. H. Rochester, Thomas Prentice, and Charles L. Pruyn, Albany.

The Ashley Valve Co., New York, has been incorporated with a capital of $50,000. Directors are: F. M. Ashley and Max Rosen, New York; J. J. Rorke, Brooklyn.

The Dorchester Agricultural Works, Dorchester, S. C.,

have been incorporated with a capital of $2,000 to manufacture plows and other farming implements. W. S. Lining is president and I. M. Williams, vice president, secretary and treasurer.

The Automatic Tablet Machine Co., Chicago, has been incorporated with a capital of $2,500 to manufacture machinery. Incorporators are: R. C. Butler, E. J. Cassaday, D. V. Rubidge.

Fires and Accidents:—

Fire at the works of the Chester Steel Casting Co., Chester, Pa., July 21, resulted in damage amounting to $10,000.

Fire on July 26 destroyed the car shops and contents of the Duluth & Iron Range Railroad Co., Two Harbors, Minn., entailing a loss of $75,000.

The foundry of Lyle & Reynolds, Crawfordsville, Ind., was damaged by fire July 24. The loss is estimated at $800.

Fire in the foundry of the Locke Regulator Co., Salem, Mass., July 28, caused a loss of $5,000, covered by insurance.

New Construction:—

The permit has been taken out for the construction of the building to be occupied by the Millice & Holcomb Foundry, Topeka, Kan. The building will cost $3,000.

The organization of the King Gas Engine Co., Iola, Kan., has been perfected and work will be begun this month on the erection of a plant. The company will build the King gas and gasoline engine and the King gasoline locomotive. The locomotive is for work in the mines and for any kind of tram work. The gas engines will be built up to 250 h. p.

The Wheeling Roofing & Cornice Co., Wheeling, W. Va., which recently increased its capital stock, contemplates making extensive additions to its plant.

The Connersville Blower Co., Connersville, Ind., has increased its capital stock from $75,000 to $125,000 and will erect an addition, 200x100 feet, equipped with the latest improved machinery, including two electric cranes.

The East End Iron Furnaces at Roanoke, Va., owned and operated by the Virginia Iron, Coal & Coke Co., have been blown out and will be closed several months for repairs and improvements.

The Racine Boat Co., Muskegon, Mich., is constructing a new foundry, 60x120 feet, with an annex to be used as a brass foundry. The building will be equipped with machinery used in the company's old plant at Racine, Wis.

The Northern Pacific Railroad is building new boiler shops at Sauth Tacoma, which was formerly Edison, Wash. The principal building will be 116x300 feet.

The Carbondale Foundry & Machine Co., Ava., Ill., has purchased five acres and will commence the erection of a foundry and machine shop.

The Illinois Foundry & Engineering Co., Edwardsville, Ill., has laid the foundation for a building of its plant, contracts for materials are being let and if weather conditions remain favorable, the plant will be in active operation by Oct. 1. The plant will be 69x100 feet and will be equipped with traveling cranes the full length of the shop, 31-foot span. The officers of the company are as follows: E. M. Miller, president and general manager, Edwardsville, Ill.; A. W. Price, treasurer, Cleveland, O.; and A. J. Miller, vice president, St. Louis, Mo.

The Globe Iron Works Co., Minneapolis, Minn., is building a plant at Menomonie, Wis. The buildings, when complete, will cost about $30,000, and will consist of machine shop and foundry. The company aims to have the best possible equipment. The plans were prepared by J. J. Flather, a consulting engineer of Minneapolis. The company will not be in the market for new equipment at present. Some machinery has already been purchased.

Morris & Lewis, Rock Island, Ill., have awarded a contract for the erection of a foundry for the manufacture of a patent railway shoe brake. The building will be one story, 172x100 feet, and will cost $15,000. It is to be completed in ninety days.

The Duluth & Iron Range Railroad is losing no time in reconstructing its burned car shops at Two Harbors, which were destroyed by fire July 25. The plans are already being drawn for new shop buildings.

The Philadelphia & Reading Railway Co. is receiving bids for a new car repair shop at Newberry Junction. The building will be 303x118 feet.

Strickland Brothers, Tuscaloosa, Ala., commenced work on their new foundry and machine shops on property recently purchased. The building will be completed about September 1.

The Cannon Pump Mfg. Co., of Waycross, Ga., capitalized at $25,000, has let the contract for a plant at North Birmingham Ala., and the work of construction is now proceeding.

The Foos Gas Engine Co., Springfield, O., is erecting an addition, 207x52 feet, brick and steel.

The first work on the addition to the plant of the Andrews Wire & Iron Works Rockford, Ill., was begun last week. The contractors are to be hurried in order that the new plant may be ready for use as soon as possible. The addition will be 680x68 feet, two stories, and will be so constructed that other additions can be made.

The Wheeling Mold & Foundry Co., Wheeling, W. Va., is greatly extending its plant in order to take care of the large tunnel casting order recently secured. Two extensions are being made, one 40 feet in length and the other 150 feet. Additional machinery is also being installed.

The Munson Heater Co., Connellsville, Pa., recently incorporated with $40,000 capital, is erecting a plant for the manufacture of these heaters. The main building will be 120 x 32 feet.

L. P. Larson, who has been operating the Gainesville Machine Works, Gainesville, Fla., under lease, has purchased and will enlarge the plant. He will also build a foundry.

The Singer Manufacturing Co. has awarded the contract for the construction of its Canadian plant to James Stewart & Co., of Pittsburg. The new plant, which will be one of the largest manufactories of any kind in Canada, will be located at St. Johns, Que., 27 miles south of Montreal and only a short distance from the northern end of Lake Champlain and will be comprised of 22 separate fire-proof buildings costing $1,000,000. Many of the buildings will be of large dimensions. The machinery building will be 850 feet in length, 6 stories, and the cabinet building 650 feet in length.

General Industrial Notes:—

The annual meeting of the Knoxville Iron Co., Knoxville, Tenn., was held last week. The old board of directors and officers were elected. It was decided that the output of the plant will be increased steadily. T. I. Stephenson, vice president and general manager, will supervise the new construction.

The puddling department of the Youngstown Iron, Sheet & Tube Co. at Youngstown, O., has resumed after an extended idleness.

The Joliet plant of the Illinois Steel Co. resumed in all departments Monday, excepting rod mill No. 2, which is expected to start a week later.

The contract has been awarded to the Parlin & Orendorff Co., of Canton, Ill., for 1,500 riding plows to be shipped to the Mantels Co., Buenos Ayres, Argentine Republic. The Superior Drill Co., of Richmond Ill., has secured a contract from the same concern for 700 seeding machines.

The plants of the Cuyahoga Wire & Fence Co., located at Newcastle, Pa., and Cuyahoga Falls, O., have been sold to C. M. A. Ward, of New York. The price paid for the property is not given, but a gauge for the value of the plants can be had from a mortgage of $450,000 on the property taken by the Trust Co. of America. No steps have yet been taken to place the plants in operation.

The 33-inch mill and six of the open-hearth furnaces of steel plant No. 3 of the Homestead plant of the Carnegie Steel Co., Pittsburg, are off this week for repairs.

Plans for the installation of a 12-inch tube mill have been submitted to the directors of the Youngstown Iron Sheet & Tube Co., Youngstown, O., by S. V. Huber, mechanical engineer, Pittsburg. It has not been definitely decided whether the mill will be built, but it is believed that the directors will act favorably at an early date.

The blast furnaces of the National Tube Co. at Lorain, O., were banked July 27. It is expected that they will be put in blast in two or three weeks.